Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

Reserve
A280.29
F22G

# TRANSPORTATION FACTORS IN MARKETING SOYBEANS, COTTONSEED, AND THEIR PRODUCTS:

## 16 SELECTED COOPERATIVES

GENERAL REPORT NO. 145

FARMER COOPERATIVE SERVICE, U.S. DEPARTMENT OF AGRICULTURE

Farmer Cooperative Service
U.S. Department of Agriculture
Washington, D.C. 20250

Farmer Cooperative Service conducts research; advises directly with cooperative leaders and others; promotes cooperative organization and development through other Federal and State agencies; and publishes results of its research, issues News for Farmer Cooperatives, and other education material.

This work is aimed (1) to help farmers get better prices for their products and reduce operating expenses, (2) to help rural and small-town residents use cooperatives to develop rural resources, (3) to help these cooperatives expand their services and operate more efficiently, and (4) to help all Americans understand the work of these cooperatives.

September 1967

U. S. DEPT. OF AGRICULTURE
NATIONAL AGRICULTURAL LIBRARY

OCT 5 - 1967

CURRENT SERIAL RECORDS

# Preface

Interest is widespread in the development of a more efficient transportation program for soybeans, cottonseed, and their products handled by farmer cooperatives, and in the transportation factors affecting the most favorable location for soybean and cottonseed processing and handling facilities. Increasing demands for this type of information from mill operators and producers have prompted the author and the U.S. Department of Agriculture to publish this report based on a study of 16 cooperative soybean and cottonseed mills during a 3-year period, 1961-63. While it is recognized that transportation rates and services have changed since the data were collected, it is believed that the various transportation cost relationships and general flow and seasonality patterns are valid and will be useful to cooperative management for comparative purposes.

This study was financed by a contract with Farmer Cooperative Service, U.S. Department of Agriculture. Robert J. Byrne, Chief, Transportation Branch, Daniel McVey, Chief, Grain Branch, and Elmer Perdue, Cotton and Oilseed Branch, Farmer Cooperative Service, developed research questionnaires and reviewed plans and the manuscript for this report.

Mrs. Theda Ballantyne, Richard Core, and Larry Thompson of Iowa State University assisted in the study. The author wishes to acknowledge, also, the cooperation received from the cottonseed and soybean oil mill personnel who provided information for the study.

# Contents


| | Page |
|---|---|
| Summary | iii |
| Implications of study | iii |
| Findings | iii |
| Study objectives and methods | 2 |
| Analysis of inbound and outbound movements | 2 |
| Inbound movement of soybeans and cottonseed to mills | 4 |
| Outbound movement of processed products | 8 |
| Seasonal patterns of the movements | 21 |
| Influence of private trucking | 21 |
| Transportation problems of the mills | 24 |
| Impact of the transit privilege | 24 |
| Effect of the Decatur-plus pricing system for soybeans | 25 |
| Transportation factors affecting future location of mills | 26 |
| Appendix | 29 |

# Summary

This study was designed to provide information needed to develop a more efficient transportation program for soybeans, cottonseed, and their products handled by farmer cooperatives, and to delineate transportation factors affecting the most favorable locations for soybean and cottonseed processing and handling facilities.

## Implications of Study

Major implications of study findings to transportation agencies and soybean and cottonseed processors are:

- Trends toward increasing production and processing of soybeans, and the search for new and wider markets for soybean products, will place additional burdens on traffic personnel to develop more efficient transportation techniques.
- Emphasis on replacement of small, outmoded cottonseed and soybean processing plants with larger, more efficient mills will require knowledge of transportation patterns to effect the most advantageous location.
- Railroad rate adjustments, if accompanied by reduction or elimination of transit privileges in the soybean processing industry, will affect present traffic patterns, plant locations, and type of transportation equipment used.
- Any significant changes in the rate relationship between raw and processed products will affect established markets, milling centers, and transit points.
- There appears to be little or no uniformity of pricing soybean meal according to the Decatur-plus system.
- Continuing shortages of adequate for-hire equipment may force increasing use by shippers of privately owned or leased rail cars, trucks, and barges.
- Firms using privately owned or leased transportation equipment appear to have service or cost advantages over those which do not.
- The rising importance of river ports as concentration centers for export shipments should bring barges into greater prominence as a major carrier of soybeans and soybean products.

## Findings

An analysis was made of the movements and costs of shipping 2 million tons of cottonseed, 4 million tons of soybeans, 900,000 tons of oil, and 4 million tons of meal by eight cooperative cottonseed mills and eight cooperative soybean mills. Soybeans and cottonseed were shipped into the 16 mills for processing and the products shipped from the mills to all parts of the Nation. Data furnished by the mills covered the daily movements for the crop years 1960-61 to 1962-63. It is estimated that the transportation bill on these commodities during this period amounted to $33 million.

The heaviest volumes of cottonseed and soybeans moved from origins within 50 miles of the processing plants. Soybean traffic was almost equally divided between railroads and trucks, whereas cottonseed was hauled primarily by trucks. The weighted average cost per ton shipped throughout all of the distances analyzed was lower for soybeans than for cottonseed.

Cottonseed oil was shipped primarily to three destinations: Houston, Memphis, and the Denison-Sherman area of Texas. Soybean oil moved to major destinations on the west coast and to New Orleans, Chicago, and points in

Texas. The only common market for cottonseed and soybean oil was the Denison-Sherman area. Soybean oil had a wider market throughout the Nation than cottonseed oil.

Railroads hauled 79 percent of the cottonseed oil and 68 percent of the soybean oil. Motor carriers moved 21 percent of the cottonseed oil and 32 percent of the soybean oil. Truck capacities ranged from 20 to 24 tons; capacities of railroad cars varied from 30 to 75 tons, with the heaviest total volume shipped in 30-ton tank cars. However, the trend during the 1962-63 crop year indicated a substantial increase in the use of 75-ton railroad cars, a result of reduced rates for larger capacity cars in that year.

Cottonseed oil shipments were relatively heavy to markets 1,000 miles or more from the mills. The heaviest volumes of soybean oil also moved to markets between 1,000 and 2,000 miles from processing plants.

There were no common destinations for cottonseed and soybean meal shipments. The largest volumes were hauled back into the areas originating the cottonseed and soybeans. Railroads carried 68 percent of the cottonseed meal and 74 percent of the soybean meal, with motor carriers hauling the remainder. In 1962-63 about 85 percent of the cottonseed meal was shipped to markets within 500 miles of the mills. By contrast, approximately 78 percent of the soybean meal moved to markets within 300 miles of the mills. Because of the transit privilege in soybean milling, railroads carried the highest percentage of the total volume of meal, particularly over the longer distances. Truck movements of soybean meal were significant to 200 miles from the processing plants, and trucks were used to a considerable degree on the return haul of soybeans to the mills. Truck movements of cottonseed meal were significant through the entire range of distances included in the study.

# TRANSPORTATION FACTORS IN MARKETING SOYBEANS, COTTONSEED, AND THEIR PRODUCTS: 16 Selected Cooperatives

by

William H. Thompson[1]

Marketing farm products has become increasingly important in an expanding national economy. Marketing costs have a greater influence on the cost of food to the consumer than does the farmer's selling price. As the marketing function expands, these costs become a primary concern in the distribution of farm products.

Transportation is an important cost item in the marketing and distribution of soybeans and cottonseed and their products. The rapid increase in soybean production and processing since World War II has forced merchandisers to carefully study trends in methods and costs of moving the commodities from farm to processor and on to the ultimate consumer. Cottonseed production has not shown a comparable expansion, but processing plants are increasing in size and changing from hydraulic processes to the more efficient screw press and solvent processes. It is essential to know the transportation patterns of cottonseed and cottonseed products when newer, larger plants are built to replace older and smaller plants.

Each year farmers market about 15 percent of the total U.S. production of soybeans through their cooperative marketing associations, and process and distribute the products through cooperative oil mills. Cooperative cottonseed oil mills process about 20 percent of the total U.S. production, and even higher percentages of production in the major cotton-producing areas.

Agricultural marketing firms, whether organized as cooperatives or not, constantly strive to develop efficient transportation programs for handling grains and products. This involves determining the most favorable locations for processing mills. In this regard information is needed on such transportation factors as freight rate structures, transit privileges, mode of transportation, and the size and direction of the traffic flow to markets.

Changing market structures have brought about changes in rate practices, in equipment, and in services offered by the carriers. Rate structures which equalize broad producing and consuming points, thus permitting equal rates for unequal distances, are now being slowly changed by point-to-point rates of the competing carriers. Transit privileges giving the shipper the opportunity to store, mix, blend, or process soybeans between producing and consuming points without additional freight charges are used somewhat less frequently than they have been in the past. At present, railroad cars of large capacity moving under rates published for 5-, 10-, or 20-car minimum shipments have tended to reduce or eliminate some of the transit privileges formerly enjoyed by soybean shippers. Larger rail cars in multiple car units, which move at lower rates, are also available to shippers of cottonseed products.

As market structures alter, managers of elevators and processing plants will find it necessary to adapt to changing transportation

[1] Dr. Thompson is Professor of Transportation, Iowa State University of Science and Technology, Ames, Iowa.

rates, services, and facilities. Larger, more efficient storage and handling facilities will be needed.

It was to evaluate the impact of these trends on 16 cooperative soybean and cottonseed processors that this study was initiated.

## Study Objectives and Methods

Specific objectives of the study were:

1. To analyze movements of soybeans, cottonseed, and their products (oil and meal) from:
   a. Country points, elevators, and cotton gins to processing plants.
   b. Processing plants to other facilities, consumers, or export.
2. To identify methods of transportation and calculate the costs of movements.
3. To evaluate the influence of transportation costs and transit privileges in these movements.
4. To determine the relationship of transportation factors to potential locations of new processing plants.
5. To develop flow patterns from sources of soybeans and cottonseed through processing to destinations.
6. To determine seasonal patterns of such movements.

Data for this study were obtained from the records of eight cooperative soybean oil mills and eight cooperative cottonseed oil mills. Fourteen mills furnished records of the daily movements of inbound volumes of soybeans and cottonseed and the outbound volumes of oil and meal. Except for the cottonseed and soybean movements, the data covered the years 1961-63. Two mills had been organized as cooperatives during the period and did not have complete records for the 3 years. The basic year in every instance was the crop year beginning September 1 and ending August 31. Over the 3-year period, the 16 mills spent an estimated $33 million for transportation. Data were collected by personal visits to each mill.

## Analysis of Inbound and Outbound Movements

The 16 mills received slightly more than 2 million tons of cottonseed and almost 4 million tons of soybeans during the 3-year period. Approximately 300,000 tons of oil and 1 million tons of meal were shipped from the cottonseed oil mills, and over 500,000 tons of oil and 3 million tons of meal moved from the soybean oil mills. Receipts and shipments for each category of commodities are shown in tables 1 and 2.

Privately owned and operated motor vehicles were important on the inbound movements of soybeans and cottonseed to the mills, and on the outbound movements of meal. Where oil was carried by motor vehicles, it was done through contract carriage. Few, if any, motor common carriers were used. The importance of the private motor carriers was in their ability to influence the transportation charges of the regulated carriers. The level of operating costs of these trucks tended to set the upper limit for charges of regulated carriers when there was competition for the traffic.

Milling-in-transit privileges are not granted by the railroads to the cottonseed oil mills but are an important transportation factor in soybean processing and transportation. The volume of soybean meal shipped "in transit" ranged from 35 percent to 100 percent, varying mill by mill. It was estimated by mill

Table 1.--Soybean receipts and soybean oil and meal shipments, 8 cooperatives, crop years ending 1961, 1962, and 1963[1]

| Item | Crop year | | | 3-year total |
|---|---|---|---|---|
| | 1960-61 | 1961-62 | 1962-63 | |
| | Tons | | | |
| Soybeans received | 1,085,605 | 1,311,255 | 1,383,611 | 3,780,471 |
| Soybeans processed | 1,025,055 | 1,256,462 | 1,299,745 | 3,581,262 |
| Soybeans sold | 60,550 | 54,793 | 83,866 | 199,209 |
| Production of oil: | | | | |
| Crude | 92,826 | 115,367 | 156,773 | 364,966 |
| Degummed | -- | 36,303 | 1,377 | 37,680 |
| Refined | 77,536 | 84,177 | 83,309 | 245,022 |
| Lecithin | 535 | 3,782 | 24,722 | 29,039 |
| Total | 170,897 | 239,629 | 266,181 | 676,707 |
| Production of meal: | | | | |
| 44% | 620,337 | 729,529 | 803,384 | 2,153,250 |
| 50% | 193,707 | 263,965 | 350,808 | 808,480 |
| Mill runs | 8,440 | 11,216 | 11,324 | 30,980 |
| Pellets | 560 | 312 | 23,587 | 24,459 |
| Total | 823,044 | 1,005,022 | 1,189,103 | 3,017,169 |
| Volume of oil shipped: | | | | |
| Crude | 101,069 | 110,315 | 169,724 | 381,108 |
| Degummed | 5,339 | -- | -- | 5,339 |
| Refined | 72,615 | 130,057 | 96,714 | 299,386 |
| Lecithin | 748 | 3,356 | 3,693 | 7,797 |
| Used in production of feed | 4,994 | 7,708 | 9,798 | 22,500 |
| Total | 184,765 | 251,436 | 279,929 | 716,130 |
| Meal used to make feed | 39,258 | 43,440 | 51,670 | 134,368 |
| Volume of meal shipped: | | | | |
| 44% bulk | 536,848 | 667,132 | 772,223 | 1,976,203 |
| 44% sacked | 109,650 | 93,368 | 72,582 | 275,600 |
| 50% bulk | 141,693 | 201,829 | 223,297 | 566,819 |
| 50% sacked | 14,324 | 14,924 | 10,216 | 39,464 |
| Pellets bulk | 55 | 67 | 11,559 | 11,681 |
| Pellets sacked | 504 | 203 | 1,230 | 1,937 |
| Mill run bulk | 5,802 | 6,868 | 8,524 | 21,194 |
| Mill run sacked | 2,821 | 3,848 | 4,201 | 10,870 |
| Total | 811,697 | 988,239 | 1,103,832 | 2,903,768 |

[1] Differences between totals of oil produced and shipped were due to inventory carryover.

Table 2.--Cottonseed receipts and cottonseed oil and meal shipments, 8 cooperatives, crop years ending 1961, 1962, and 1963

| Item | Crop year | | | 3-year total |
|---|---|---|---|---|
| | 1960-61 | 1961-62 | 1962-63 | |
| | Tons | | | |
| Cottonseed received | 594,034 | 710,934 | 727,694 | 2,032,662 |
| Cottonseed processed | 568,597 | 612,843 | 716,096 | 1,897,536 |
| Cottonseed sold | 25,437 | 98,091 | 11,598 | 135,126 |
| Production of oil | 98,968 | 105,114 | 121,281 | 325,363 |
| Production of meal | 286,206 | 290,864 | 333,626 | 910,696 |
| Volume of crude oil shipped | 97,286 | 100,029 | 100,970 | 298,285 |
| Meal used to make feed | 4,230 | 3,382 | 3,793 | 11,405 |
| Volume of meal shipped: | | | | |
| Bulk | 123,936 | 132,778 | 171,035 | 427,749 |
| Bulk cake | 200 | 1,925 | 197 | 2,322 |
| Sacked meal | 93,657 | 94,797 | 88,086 | 276,540 |
| Sacked cake | 333 | -- | -- | 333 |
| Bulk pellets (meal only) | 1,389 | 1,504 | 2,544 | 5,437 |
| Sacked pellets | 74,013 | 69,245 | 77,426 | 220,684 |
| Total meal | 293,528 | 300,249 | 339,288 | 933,065 |

personnel that if the transit privilege should be eliminated, as suggested from time to time in rate adjustment proposals, the cost of the railroad movement of soybeans would be increased 6 to 8 cents per bushel. It was further suggested that if such a policy were followed plant management would substitute motor carriers for rail, the market area for meal would be reduced, and processing plants might have to be relocated.

## Inbound Movement of Soybeans and Cottonseed to Mills

Data for only 1 crop year, 1962-63, were requested for a detailed analysis of movements of soybeans and cottonseed to the mills. Hundreds of origins were involved and from them, hundreds of individual movements occurred. It was impractical to show patterns and costs of the movements from each origin point. Therefore, all origins were grouped into mileage blocks according to distance from the mill, using 50-mile intervals. For each block, total tons originated, percentage of total volume moved to the mills, and transportation costs per ton were computed. Per ton costs are weighted averages of the volumes shown in each block.[2]

Table 3 shows percentage of cottonseed originating in each mileage block. Table 4 gives similar data on the soybean movements. Comparisons of the movements of both commodities are given in table 5. In figures 1 and 2, tonnage originating in each mileage block and cost per ton of soybeans and cottonseed shipments are shown graphically.

[2] Mileages were computed for trucks from the Rand McNally Highway Mileage Guide. For rails, the 28300 mileage tariffs were used. See appendix 1 for a more complete analysis of the movements of cottonseed, soybeans, and their products.

Cottonseed movements, as indicated in table 3, showed a concentration of tonnage originating within 50 miles of the mills. Only 10 percent of the total was hauled by railroads, with the remainder carried in trucks owned or contracted for by the cotton gins or mills.

The highest volume of soybeans was also moved from origins within 50 miles of the mills. However, larger percentages of soybeans than of cottonseed originated in the higher mileage blocks. Part of the reason for this disparity is that the origins for cottonseed movements were the cotton gins, and movement from the farm to the gin was not included in the data.

Soybean traffic was divided almost equally between rail and truck, with truck volume heavy for the first 50 miles and thereafter declining rapidly in importance. The volume carried by railroads was probably a reflection of the significance of the transit privilege in the milling of soybeans into meal. Trucks used were owned or under contract, either by farmers who hauled meal on the return trip

Table 3.--Distribution of cottonseed receipts, by mileage block and mode of transportation, 8 cooperatives, crop year 1962-63

| Mileage block [1] | Tons | Percent | Average shipping cost per ton |
|---|---|---|---|
| 0-49 | 473,244 | 65 | $2.40 |
| 50-99 | 192,830 | 26 | 3.71 |
| 100-149 | 40,128 | 6 | 4.65 |
| 150 and over | 21,492 | 3 | 5.62 |
| Total | 727,694 | 100 | |

Truck shipments 90 percent.

Rail shipments 10 percent.

Total cost $2,124,665

[1] Miles from origins to mills.

Table 4.--Distribution of soybean receipts, by mileage block and mode of transportation, 8 cooperatives, crop year 1962-63

| Mileage block [1] | Tons | Percent | Percent by rail | Percent by truck | Average shipping cost per ton |
|---|---|---|---|---|---|
| 0-49 | 750,715 | 54 | 34 | 66 | $1.47 |
| 50-99 | 398,123 | 29 | 59 | 41 | 2.50 |
| 100-149 | 133,156 | 10 | 69 | 31 | 3.73 |
| 150 and over | 101,617 | 7 | 99 | 1 | 5.37 |
| Total | 1,383,611 | 100 | 50.1 | 49.9 | |

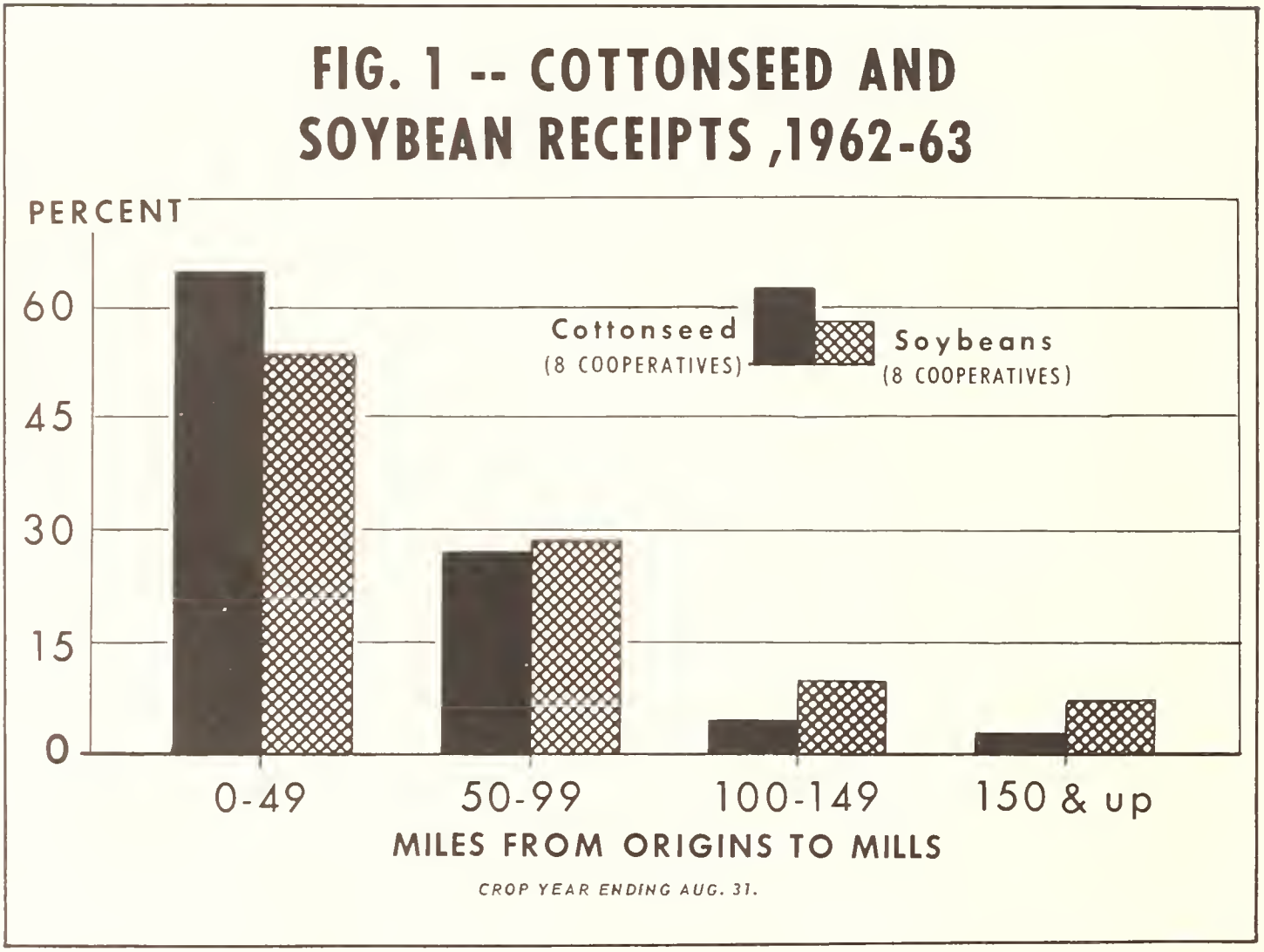
Total cost $3,052,526

[1] Miles from origins to mills.

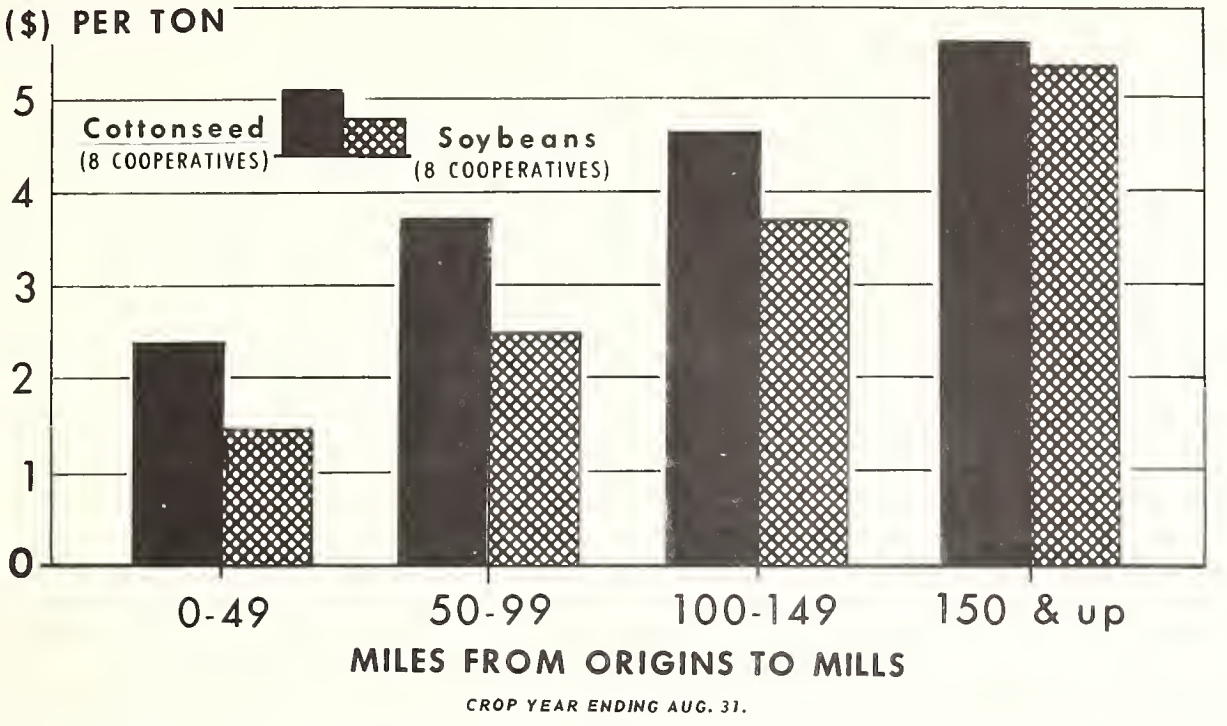
Table 5.--Tonnage and shipping costs per ton, by mileage blocks, of cottonseed and soybeans, 16 cooperatives, crop year 1962-63

| Mileage block [1] | Percent received | | Average cost per ton | |
|---|---|---|---|---|
| | Cottonseed | Soybeans | Cottonseed | Soybeans |
| 0-49 | 65 | 54 | $2.40 | $1.47 |
| 50-99 | 27 | 29 | 3.71 | 2.50 |
| 100-149 | 5 | 10 | 4.65 | 3.73 |
| 150 and over | 3 | 7 | 5.62 | 5.37 |
| Total | 100 | 100 | 2.91 | 2.20 |

[1] Miles from origins to mills.



## FIG. 2 -- COSTS OF SHIPPING COTTONSEED AND SOYBEANS ,1962-63




or by the mills which hauled meal one way and soybeans on the return movement. Few motor common carriers were found in either the cottonseed or soybean traffic.

Significant differences in the movement patterns of soybeans and cottonseed to the processing plants may be observed by comparing tonnage moved and per ton costs shown in table 5. Throughout every mileage block, per ton costs for soybean movements were lower than those of cottonseed. In some of the cottonseed mills a bonus or credit arrangement was made for the procurement of cottonseed, with the amount varying considerably in the mills following this practice. Deduction of such amounts, had they been known, from the per ton costs would have probably changed the dollar amounts shown for each commodity in table 5 throughout the entire range of mileages.

On the basis of the known data, it is probable that the intense competition between railroads and trucks had an influence in keeping ton-mile costs relatively low on soybean tonnage.[3] The lack of intermodal competition on the cottonseed traffic, including the absence of transit privileges, may have been a factor in the level of costs. It is important in the analysis to consider the effect of improved highway facilities, lack of congestion and delay at the mills, loading and unloading procedures, use of large-capacity railroad cars, and the per ton cost levels of each commodity.

It was estimated that the cost of transporting cottonseed to the processing plants during the 1962-63 crop year was approximately $2 million, and that the cost of transporting soybeans was over $3 million.

[3] In a study of the procurement practices of Iowa soybean processors, it was found that the mills could originate a plentiful supply of soybeans by truck at a maximum freight charge of 4 cents a bushel, or approximately $1.32 per ton within 100 miles of the plant. J. W. Uhrig. Economic Effects of Changes in Transportation Rates and Processing Capacity on Soybean Procurement by Iowa Processors, Ph.D. dissertation, unpublished, Iowa State University, 1965.

# Outbound Movement of Processed Products

Oil and meal processed by the 16 cooperative soybean and cottonseed mills were shipped to markets in all parts of the Nation.

## Movement of Oil

Percentages of the volume of cottonseed and soybean oil shipped into major destinations are shown in tables 6 and 7. Only the major destinations are listed. (A more complete list of destinations for these oils is found in the appendix.) In each of the 3 years, Houston and Memphis received over 50 percent of the cottonseed oil, with other Texas points accounting for another 10 percent. It was presumed that oil moved to these destinations for refining and further domestic movement, for export as crude oil, or for export as refined oil.[4] The remainder of the shipments from the cottonseed processing plants were scattered throughout the Midwest and East.

Four general destinations received approximately 60 percent of the soybean oil shipments. These were the west coast points, New Orleans, cities in the Chicago area, and destinations in Texas. A wider market area was indicated for soybean oil than cottonseed oil, as evidenced by the distribution into more cities, and also by the larger percentage of the total volume moved into "other" destinations. The only common market of significance for both soybeans and cottonseed oil was the Denison-Sherman, Tex. area.

The oil was moved by rail and truck as shown in table 8. Barges were not important during the period analyzed, but were occupying a more vital role in the future transportation plans of those mills which had access to waterways. Of the total volume of 298,285 tons of cottonseed oil shipped, railroads carried 79 percent and trucks 21 percent. The only market which showed receipts signifi-

[4] Refined oil was shipped from only 2 of the 16 mills. Since the refined oil was moved to the same destinations as crude oil, no distinction has been made between the two and both have been combined under "oil movements."

Table 6.--Distribution of cottonseed oil shipped to major destinations, 8 cooperatives, crop years ending 1961, 1962, and 1963

| Destination | 1960-61 | 1961-62 | 1962-63 | 3-year average |
|---|---|---|---|---|
| | Percent | | | |
| Houston | 36 | 17 | 26 | 26 |
| Memphis | 23 | 41 | 29 | 32 |
| Denison-Sherman, Tex. | 10 | 14 | 13 | 10 |
| Chicago area | 5 | 4 | 2 | 3 |
| Jacksonville, Ill. | 4 | 5 | 4 | 4 |
| New York area | 4 | 3 | 2 | 3 |
| Gretna, La. | 4 | 2 | 3 | 6 |
| Louisville | 3 | 4 | 2 | 2 |
| Eastern Canada | 2 | 2 | 1 | 1 |
| Abilene, Tex. | -- | 3 | 3 | 2 |
| Other | 9 | 5 | 15 | 11 |
| Total | 100 | 100 | 100 | 100 |

Table 7.--Distribution of soybean oil shipped to major destinations, 8 cooperatives, crop years ending 1961, 1962, and 1963

| Destination | 1960-61 | 1961-62 | 1962-63 | 3-year average |
|---|---|---|---|---|
| | Percent | | | |
| West coast | 24 | 19 | 16 | 19 |
| Chicago area | 15 | 9 | 12 | 12 |
| New Orleans | 11 | 23 | 19 | 18 |
| Denison-Sherman | 10 | 6 | 6 | 7 |
| Memphis | 7 | 1 | 1 | 2 |
| New York area | 4 | 4 | 3 | 4 |
| St. Louis | 3 | 2 | 8 | 4 |
| Mankato, Minn | -- | 3 | 2 | 2 |
| Jacksonville, Ill | 2 | 1 | 2 | 2 |
| Decatur, Ill. | 1 | 1 | 3 | 2 |
| Dallas | -- | 3 | 1 | 2 |
| Baltimore | -- | 2 | 1 | 2 |
| Charleston, S.C. | -- | 2 | 2 | 2 |
| Other | 23 | 24 | 24 | 22 |
| Total | 100 | 100 | 100 | 100 |
| Tons | 179,770 | 243,730 | 270,130 | 693,630 |

Table 8.--Rail and truck movements of oil to major destinations, 16 cooperatives, crop years ending 1961, 1962, and 1963

| Destination | Cottonseed oil | | Soybean oil | |
|---|---|---|---|---|
| | Rail | Truck | Rail | Truck |
| | Percent | | | |
| Houston | 28 | 72 | 100 | -- |
| Memphis | 67 | 33 | 81 | 19 |
| Denison-Sherman | 75 | 25 | 80 | 20 |
| Jacksonville, Ill. | 97 | 3 | 66 | 34 |
| New York area | 100 | -- | 100 | -- |
| Gretna, La. | 100 | -- | 100 | -- |
| Chicago area | 92 | 8 | 40 | 60 |
| Louisville, Ky | 100 | -- | 100 | -- |
| Eastern Canada | 100 | -- | 100 | -- |
| St. Louis | 97 | 3 | 100 | -- |
| West coast area | 100 | -- | 100 | -- |
| New Orleans | -- | -- | 75 | 25 |
| Opelousa, La. | 100 | -- | -- | -- |
| Dallas | 97 | 3 | 100 | -- |
| Mankato, Minn. | -- | -- | 98 | 2 |
| Baltimore | -- | -- | 100 | -- |
| Charleston, S.C. | -- | -- | 100 | -- |
| Abilene, Tex. | 100 | -- | -- | -- |
| Greenville, Miss. | 100 | -- | -- | -- |
| Decatur, Ill. | -- | -- | 100 | -- |
| Minneapolis | -- | -- | 69 | 31 |
| Ivorydale, Ohio | -- | -- | 100 | -- |
| Total | 79 | 21 | 68 | 32 |

cantly higher by truck than by rail was Houston. However, truck movements were also important to Memphis and to the Denison-Sherman area of Texas.

Over the 3 years, the movement of soybean oil amounted to 693,630 tons, of which 68 percent was hauled by railroads and 32 percent by trucks. One market, the Chicago area, showed a predominance of truck over railroad tonnage. Other markets important for trucks were Minneapolis, Jacksonville, New Orleans, Texas points, and Memphis.

Tables 9 and 10 show the type and number of items of rail and truck equipment used in the oil movements during the 3-year period. Truck sizes varied between 20 and 24 tons, whereas the heaviest volume shipped by railroad was handled in 30-ton cars. In the 3 years, two trends were apparent in the type of equipment used by the carriers. One was the rising importance of trucks on through highway movements or used in combination with other transport modes; the other was the use of larger railroad tank cars, especially the increasingly popular 75-ton car, in order to take advantage of rate reductions for higher minimum weight shipments.[5]

The only common market of significance for oil shipped from cottonseed and soybean oil mills was the Denison-Sherman area of Texas. So many individual markets at longer distances were involved that it was necessary to group markets into mileage blocks according to

[5] For example, to west coast points the 75-ton car moved under a $20 per ton rate as compared with $28 on the 30- and 37 1/2-ton cars. Similar reductions on larger cars were found on traffic into the Chicago area.

Table 9.--Type of equipment used on cottonseed oil movements to major destinations, 8 cooperatives, crop years ending 1961, 1962, and 1963

| Destination | Trucks [1] | Rail cars | Size of rail cars | | |
|---|---|---|---|---|---|
| | | | 30T | 37½ T | 75T |
| | ---- Number ---- | | ---- Percent ---- | | |
| Houston | 2,516 | 622 | 86 | 12 | 2 |
| Memphis | 913 | 2,877 | 99 | 01 | -- |
| Denison-Sherman | 647 | 492 | 77 | 12 | 11 |
| Gretna, La. | -- | 548 | 99 | -- | 01 |
| Jacksonville, Ill. | 6 | 300 | 79 | 09 | 12 |
| Chicago area | 32 | 295 | 73 | 22 | 05 |
| New York area | -- | 218 | 28 | 72 | -- |
| Louisville | -- | 214 | 95 | 05 | -- |
| Eastern Canada | -- | 206 | 94 | 06 | -- |
| Opelousa, La. | 1 | 132 | 83 | 17 | -- |
| Other [2] | 221 | 839 | 83 | 06 | 11 |
| Total | 4,336 | 6,743 | 89 | 08 | 03 |

[1] 20-24 ton loads
[2] Includes 153 truck loads for transshipment by barge

Table 10.--Type of equipment used on soybean oil movements to major destinations, 8 cooperatives, crop years ending 1961, 1962, and 1963

| Destination | Trucks [1] | Rail cars | Size of rail cars | | |
|---|---|---|---|---|---|
| | | | 30T | 37½ T | 75T |
| | ---- Number ---- | | ---- Percent ---- | | |
| New Orleans | 4,670 [2] | 1,264 | 99 | -- | 01 |
| West coast | -- | 3,788 | 89 | 04 | 07 |
| Chicago area | 497 | 2,234 | 98 | 02 | -- |
| Denison-Sherman | 513 | 1,267 | 95 | 03 | 02 |
| New York area | -- | 880 | 99 | 01 | -- |
| St. Louis | 662 [3] | 382 | 99 | -- | 01 |
| Decatur, Ill. | -- | 505 | 94 | 01 | 05 |
| Memphis | 175 | 413 | 100 | -- | -- |
| Mankato, Minn. | 6 | 339 | 98 | -- | 02 |
| Dallas | 197 | 266 | 96 | 02 | 02 |
| Other | 577 | 2,688 | 97 | 02 | 01 |
| Total | 7,297 | 14,026 | 95 | 02 | 03 |

[1] 20-24 ton loads
[2] Includes 62 barge-truck combinations
[3] Includes 9 barge-truck combinations

Table 11.--Distribution of cottonseed and soybean oil shipped, by mileage block, 16 cooperatives, crop years ending 1961, 1962, and 1963

| Mileage block [1] | 1960-61 | | 1961-62 | | 1962-63 | | 3-year average | |
|---|---|---|---|---|---|---|---|---|
| | Cotton-seed oil | Soy-bean oil | Cotton-seed oil | Soy-bean oil | Cotton-seed oil | Soy-bean oil | Cotton-seed oil | Soy-bean oil |
| | Percent | | | | | | | |
| 0-499 | 37 | 48 | 43 | 44 | 50 | 58 | 43 | 51 |
| 500-999 | 53 | 9 | 49 | 11 | 43 | 10 | 48 | 10 |
| 1,000-1,499 | 4 | 10 | 4 | 21 | 4 | 12 | 4 | 15 |
| 1,500-1,999 | 6 | 33 | 4 | 24 | 3 | 20 | 5 | 24 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

[1] Miles from mills to market.

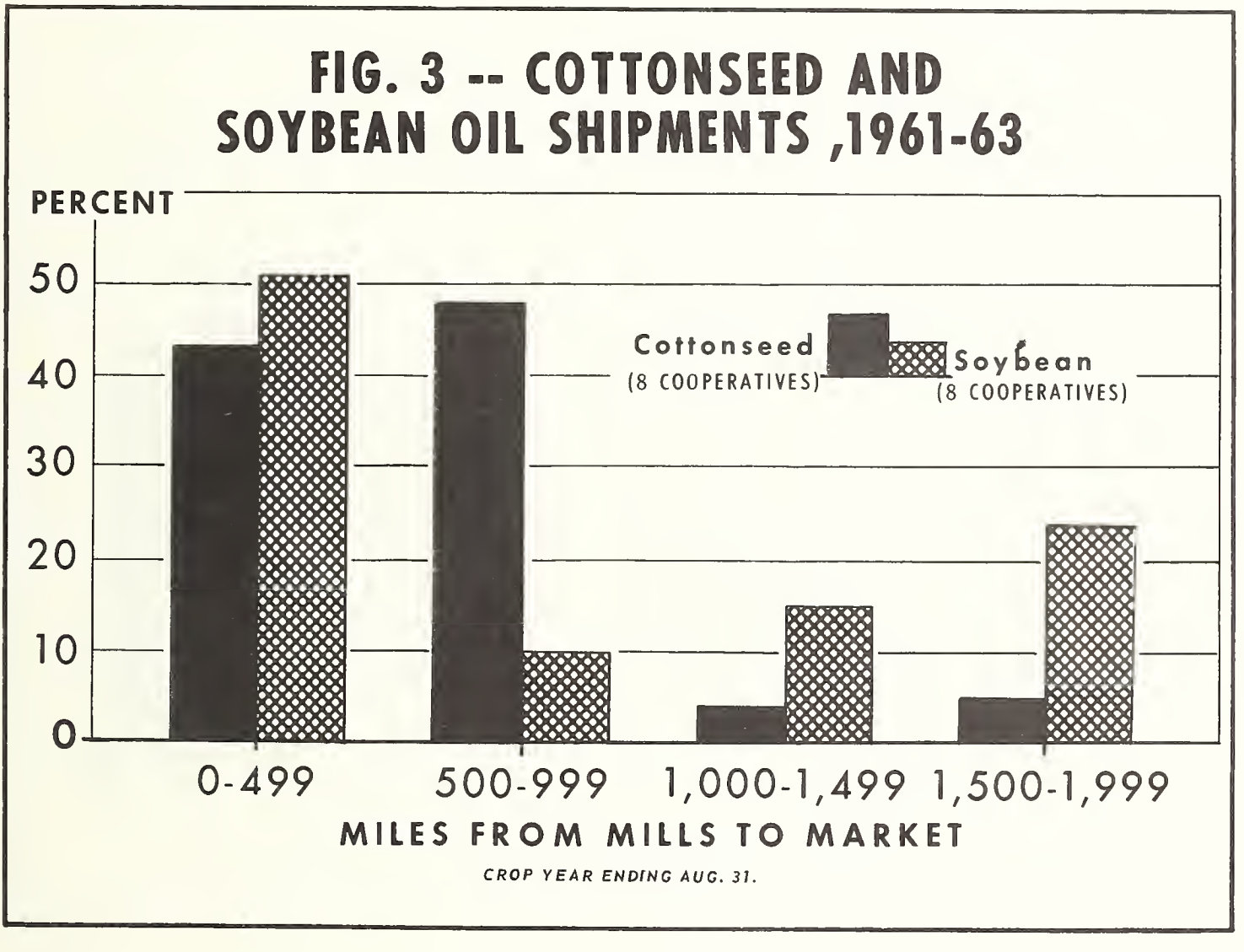
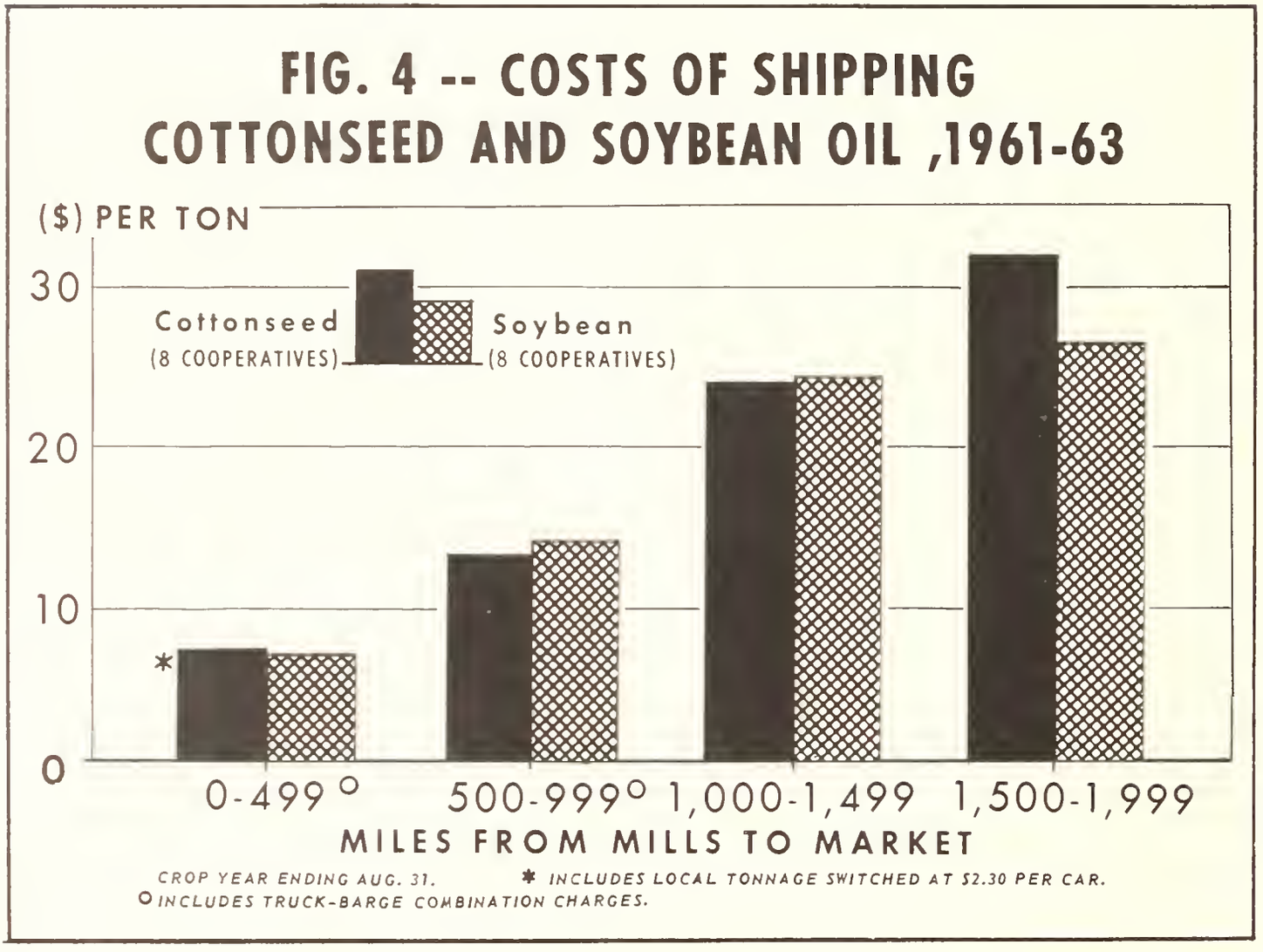


Table 12.--Costs of shipping cottonseed and soybean oil, by mileage blocks, 16 cooperatives, crop years ending 1961, 1962, and 1963

| Mileage block [1] | 1960-61 | | 1961-62 | | 1962-63 | | 1960-63 | |
|---|---|---|---|---|---|---|---|---|
| | Cotton-seed oil | Soy-bean oil | Cotton-seed oil | Soy-bean oil | Cotton-seed oil | Soy-bean oil | Cotton-seed oil | Soy-bean oil |
| | Per ton | | | | | | | |
| 0-499 [2] | $6.49 [3] | $7.54 | $7.49 [3] | $7.16 | $7.22 [3] | $6.30 | $7.11 [3] | $6.88 |
| 500-999 [2] | 12.53 | 13.65 | 13.12 | 13.85 | 12.64 | 13.76 | 12.96 | 13.97 |
| 1000-1499 | 22.12 | 23.29 | 24.13 | 24.75 | 24.59 | 23.50 | 23.92 | 24.09 |
| 1500-1999 | 32.37 | 27.92 | 33.76 | 27.93 | 34.11 | 23.20 | 32.11 | 26.57 |

[1] Miles from mills to market
[2] Including truck-barge combination charges
[3] Including local tonnage switched at $2.30 per car



distance. Intervals of 500 miles were used for this grouping. Distances over which the oil moved were much greater than distances moved by cottonseed and soybeans into the mills and by meal away from the mills. Tonnages of oil moving to markets in each of the mileage blocks for each of the 3 years and during the overall period are given in table 11 and in figure 3. Cottonseed oil moved in heavy volume to markets approximately 1,000 miles or less from the processing plants. Beyond 1,000 miles the movement fell drastically. Soybean oil moved in its heaviest volume to markets up to 500 miles from the mills, but a significant movement also occurred to markets in the 1,500- to 2,000-mile block. During the 3-year period, some percentage changes occurred in tonnage moved within each mileage block. The changes appeared to be more important for the soybean oil processors than for those processing cottonseed oil. The trends, however, may be more meaningful when considered in terms of an increase in the total tonnage of each commodity shipped in each of the 3 years.

The per ton costs of movements of oil are shown in table 12 and in figure 4. The costs are weighted averages of line haul-and-switching charges of rail lines as published in their tariffs, and of actual and estimated truck charges calculated for 500-mile blocks. A few of the truck averages include combination movements of trucks and barges. The costs generally increased with distance. Considering the fact that traffic may have been concentrated at any mileage point within the 500 miles comprising each block, it is surprising to find so little difference in the level of costs on the cottonseed and soybean oil movements[6]. For the 3 years, the movement of cottonseed oil required an estimated expenditure of $3,700,000. The charges for soybean oil shipments were estimated at $8,800,000.

[6] For example, soybean oil movements may have been relatively heavy for distances of 100 to 300 miles. Cottonseed oil traffic, on the other hand, may have been heavy for distances of 200 to 400 miles. Since all movements would appear within the 0 to 500-mile block, the charges would not reflect actual miles. The reader is therefore cautioned not to accept the cost data as actual rates for one or the other of the mileage extremes in each block.

## Movement of Meal

There were no common destinations for soybean and cottonseed meal, as the largest volumes were generally shipped back into the areas which originated the cottonseed and soybeans. The problems of analyzing the data were similar, but of greater magnitude, than those found in analyzing the inbound movements to the mills and the shipments of oil--namely, the existence of hundreds of markets or buyers and the thousands of individual shipments from the mills. The problem was further complicated by the fact that many of the movements were backhauls for cottonseed and soybean traffic, and, more often than not, records of truck movements on an f.o.b. mill basis were not available. Then, too, it was necessary to isolate the transit balance charges from the soybean mills on the meal moving by rail under transit privileges.

Following the technique used for the other commodities, mileage blocks of 100 miles each were set up and the data calculated on that basis. For each mileage block, data were divided into percentages of total volume shipped, percentage of the volume hauled by railroads and by highway carriers, and costs per ton of railroad and truck shipments.

Meal was moved in a variety of different-sized motor vehicles as contrasted to the so-called standard-sized railroad car. Nevertheless, there was a relatively small difference in the average per ton costs between the railroad and truck movements.

The distribution of cottonseed meal among mileage blocks in each of the 3 years is shown for rail and truck movements in table 13. In all 3 years, the greatest volume moved to markets within 500 miles from the mills. The proportion increased from 73 percent of total shipments in 1960-61 to 85 percent (of a higher tonnage) in 1962-63. Part of the increase resulted from the rapid fall in the percentage shipped beyond 700 miles after the 1960-61 season. The percentage shipped by railroad showed a trend similar to that of the total volume shipments, whereas truck percentages remained relatively constant over the period.

Table 14 shows the per ton charges for shipping cottonseed meal by rail and truck.

Table 13.--Shipments of cottonseed meal, by mileage blocks, 8 cooperatives, crop years ending 1961, 1962, and 1963

| Mileage block [1] | Total volume | | | Railroad | | | Truck | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1960-61 | 1961-62 | 1962-63 | 1960-61 | 1961-62 | 1962-63 | 1960-61 | 1961-62 | 1962-63 |
| | Percent | | | | | | | | |
| 0-99 | 6 | 9 | 9 | 7 | 10 | 12 | 4 | 8 | 8 |
| 100-199 | 7 | 9 | 8 | 6 | 11 | 8 | 8 | 8 | 7 |
| 200-299 | 29 | 36 | 39 | 15 | 20 | 27 | 44 | 49 | 49 |
| 300-399 | 20 | 18 | 18 | 21 | 22 | 21 | 18 | 16 | 15 |
| 400-499 | 11 | 11 | 11 | 12 | 15 | 13 | 9 | 8 | 9 |
| 500-599 | 6 | 6 | 8 | 4 | 6 | 8 | 8 | 7 | 8 |
| 600-699 | 7 | 7 | 4 | 11 | 11 | 6 | 6 | 2 | 3 |
| 700 and over | 14 | 4 | 3 | 24 | 5 | 5 | 3 | 2 | 1 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

[1] Miles from mills to market

Table 14.--Costs of shipping cottonseed meal, by mileage blocks, 8 cooperatives, crop years ending 1961, 1962, and 1963

| Mileage block [1] | 1960-61 | | 1961-62 | | 1962-63 | |
|---|---|---|---|---|---|---|
| | Rail | Truck | Rail | Truck | Rail | Truck |
| | Per ton | | | | | |
| 0-99 | $1.71 | $2.05 | $1.51 | $1.52 | $1.58 | $1.88 |
| 100-199 | 2.87 | 4.11 | 2.88 | 4.20 | 2.92 | 4.15 |
| 200-299 | 4.31 | 4.78 | 4.40 | 4.79 | 4.48 | 4.74 |
| 300-399 | 5.21 | 6.10 | 5.00 | 6.08 | 5.21 | 5.88 |
| 400-499 | 7.20 | 7.22 | 6.38 | 7.50 | 6.45 | 6.97 |
| 500-599 | 8.88 | 7.53 | 7.79 | 7.49 | 7.68 | 7.58 |
| 600-699 | 10.18 | 12.23 | 9.57 | 12.25 | 9.90 | 12.24 |
| 700 and over | 12.43 | 15.95 | 11.52 | 13.38 | 11.12 | 15.00 |

[1] Miles from mills to market

Charges for railroad service, with few exceptions, were lower than for shipment by highway carrier. However, railroad charges were measured from the mill siding to a terminal at the destination point, whereas the cost of trucking was measured from the mill dock to the ranches or farms. The influence of competition between the two modes may be seen in each of the 3 years throughout some of the mileage blocks. It was possible to compute the weighted average costs on a large part of the total movement. Shipments for which no charges were found were handled primarily by truck.

The division of traffic by each mode of transportation in each of the mileage blocks is found in table 15. Generally, each mode seemed to hold its share of the movements for each of the 3 years, with only minor variations from year to year.

Almost 80 percent of the soybean meal was shipped within 300 miles of the mills, and this percentage held over the 3 years (table 16). The other significant movement was to distances over 700 miles. The railroads had a much greater share than the trucks in these shipments.

Difficulties arose in attempting to analyze the motor carrier charges for hauling soybean meal, as many of the shipments were f.o.b. mill and no records were maintained. Only four of the eight mills were able to submit data. Therefore, for a number of the mileage blocks, no truck data were listed with which comparisons of railroad charges could be made. The data listed in table 17 show no particular pattern. The charges for both modes increased with distances, with a substantial increase in the railroad costs per ton over 700 miles, indicating the presence of longer hauls.

Table 18 shows the importance of the railroad movement to each mileage block. Except for the distances to 100 miles, railroads dominated the traffic patterns, undoubtedly as a result of the transit privileges on these shipments.

A comparison of the shipments and charges for movements of cottonseed meal and soybean meal for the 3-year period is found in tables 19 through 21, and is shown graphically in figures 5 and 6. Approximately 80 percent of the cottonseed meal moved to markets as far as 500 miles from the mills, whereas an equal

Table 15.--Rail and truck movements of cottonseed meal, by mileage blocks, 8 cooperatives, crop years ending 1961, 1962, and 1963

| Mileage block [1] | 1960-61 | | 1961-62 | | 1962-63 | |
|---|---|---|---|---|---|---|
| | Rail | Truck | Rail | Truck | Rail | Truck |
| | Percent | | | | | |
| 0-99 | 36 | 64 | 33 | 67 | 33 | 67 |
| 100-199 | 51 | 49 | 50 | 50 | 49 | 51 |
| 200-299 | 63 | 37 | 55 | 45 | 65 | 35 |
| 300-399 | 62 | 38 | 60 | 40 | 68 | 32 |
| 400-499 | 61 | 39 | 53 | 47 | 54 | 46 |
| 500-599 | 82 | 18 | 75 | 25 | 70 | 30 |
| 600-699 | 81 | 19 | 70 | 30 | 75 | 25 |
| 700 and over | 92 | 8 | 90 | 10 | 96 | 4 |

[1] Miles from mills to market

Table 16.--Shipments of soybean meal, by mileage blocks, 8 cooperatives, crop years, ending 1961, 1962, and 1963

| Mileage block [1] | Total volume | | | Rail | | | Truck | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1960-61 | 1961-62 | 1962-63 | 1960-61 | 1961-62 | 1962-63 | 1960-61 | 1961-62 | 1962-63 |
| | Percent | | | | | | | | |
| 0-99 | 45 | 44 | 38 | 33 | 27 | 23 | 75 | 79 | 69 |
| 100-199 | 25 | 24 | 26 | 25 | 27 | 30 | 22 | 15 | 19 |
| 200-299 | 9 | 10 | 14 | 12 | 14 | 19 | 2 | 2 | 5 |
| 300-399 | 4 | 2 | 4 | 5 | 3 | 4 | -- | 1 | 4 |
| 400-499 | 4 | 5 | 3 | 6 | 6 | 3 | 1 | 2 | 2 |
| 500-599 | 3 | 6 | 6 | 4 | 9 | 9 | -- | -- | -- |
| 600-699 | -- | -- | 1 | -- | -- | 1 | -- | -- | -- |
| 700 and over | 10 | 9 | 8 | 15 | 14 | 11 | -- | 1 | 1 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

[1] Miles from mills to market

Table 17.--Costs of shipping soybean meal, by mileage blocks, 8 cooperatives, crop years ending 1961, 1962, and 1963

| Mileage block [1] | 1960-61 | | 1961-62 | | 1962-63 | |
|---|---|---|---|---|---|---|
| | Rail | Truck | Rail | Truck | Rail | Truck |
| | Per ton | | | | | |
| 0-99 | $2.33 | $1.65 | $2.63 | $1.94 | $2.34 | $1.77 |
| 100-199 | 2.91 | 3.46 | 3.07 | 3.26 | 3.37 | 3.52 |
| 200-299 | 4.57 | 4.26 | 4.46 | 4.20 | 5.19 | 5.41 |
| 300-399 | 5.06 | 5.80 | 5.29 | 7.06 | 4.92 | -- |
| 400-499 | 8.10 | -- | 7.10 | 7.65 | 7.87 | 7.59 |
| 500-599 | 8.09 | -- | 7.54 | -- | 6.61 | -- |
| 600-699 | 9.13 | -- | 11.29 | -- | 8.30 | -- |
| 700 and over | 19.89 | -- | 20.95 | -- | 21.10 | -- |

[1] Miles from mills to market

Table 18.--Rail and truck movements of soybean meal, by mileage block, 8 cooperatives, crop years ending 1961, 1962, and 1963

| Mileage block[1] | 1960-61 | | 1961-62 | | 1962-63 | |
|---|---|---|---|---|---|---|
| | Rail | Truck | Rail | Truck | Rail | Truck |
| | Percent | | | | | |
| 0-99 | 33 | 67 | 27 | 73 | 30 | 70 |
| 100-199 | 75 | 25 | 81 | 19 | 77 | 23 |
| 200-299 | 96 | 4 | 91 | 9 | 88 | 12 |
| 300-399 | 98 | 2 | 90 | 10 | 68 | 32 |
| 400-499 | 92 | 8 | 88 | 12 | 81 | 19 |
| 500-599 | 100 | -- | 100 | -- | 93 | 7 |
| 600-699 | 87 | 13 | 95 | 5 | 100 | -- |
| 700 and over | 100 | -- | 97 | 3 | 100 | -- |

[1] Miles from mills to market

Table 19.--Shipments of cottonseed and soybean meal, 16 cooperatives, crop years ending 1961, 1962, and 1963

| Mileage block[1] | Total volume | | Rail | | Truck | |
|---|---|---|---|---|---|---|
| | Cotton-seed | Soy-beans | Cotton-seed | Soy-beans | Cotton-seed | Soy-beans |
| | Percent | | | | | |
| 0-99 | 8 | 42 | 9 | 27 | 7 | 74 |
| 100-199 | 8 | 25 | 8 | 28 | 8 | 18 |
| 200-299 | 35 | 11 | 21 | 15 | 47 | 3 |
| 300-399 | 19 | 4 | 22 | 4 | 16 | 2 |
| 400-499 | 10 | 4 | 13 | 5 | 9 | 2 |
| 500-599 | 7 | 5 | 6 | 7 | 8 | -- |
| 600-699 | 6 | -- | 9 | 1 | 3 | -- |
| 700 and over | 7 | 9 | 12 | 13 | 2 | 1 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 |
| Percent distribution between rail and truck | | | 68 | 73 | 32 | 27 |

[1] Miles from mills to market

percentage of soybean meal moved to markets not more than 300 miles from processing plants. It seems evident that the major markets for soybean meal are about 200 miles closer to the processors' plants than are those for cottonseed meal. However, smaller percentages are shown throughout the entire range of distances for cottonseed meal, whereas soybean meal movements appeared to stabilize at relatively low volumes at points beyond 300 miles from the mills. These differences are probably the result of the concentrated livestock and poultry feeding areas, which draw on the soybean processors for feed, as contrasted to the more widely scattered feeding areas served by the cottonseed mills.

Over the 3-year period, 68 percent of the cottonseed meal and 75 percent of the soybean meal moved by rail. Some rail movement was found in each mileage block. Truck movements of soybean meal were significant through 200 miles, and fell sharply thereafter. By contrast, trucks hauled cottonseed meal throughout all distance blocks. The railroad transit privilege on soybeans undoubtedly contributed materially to this situation. A further indication of the predominant position of the railroads in the meal movements is found in table 20, which shows the division of traffic within each mileage block. The contrast between rail and truck movements, especially of soybean meal, was impressive.

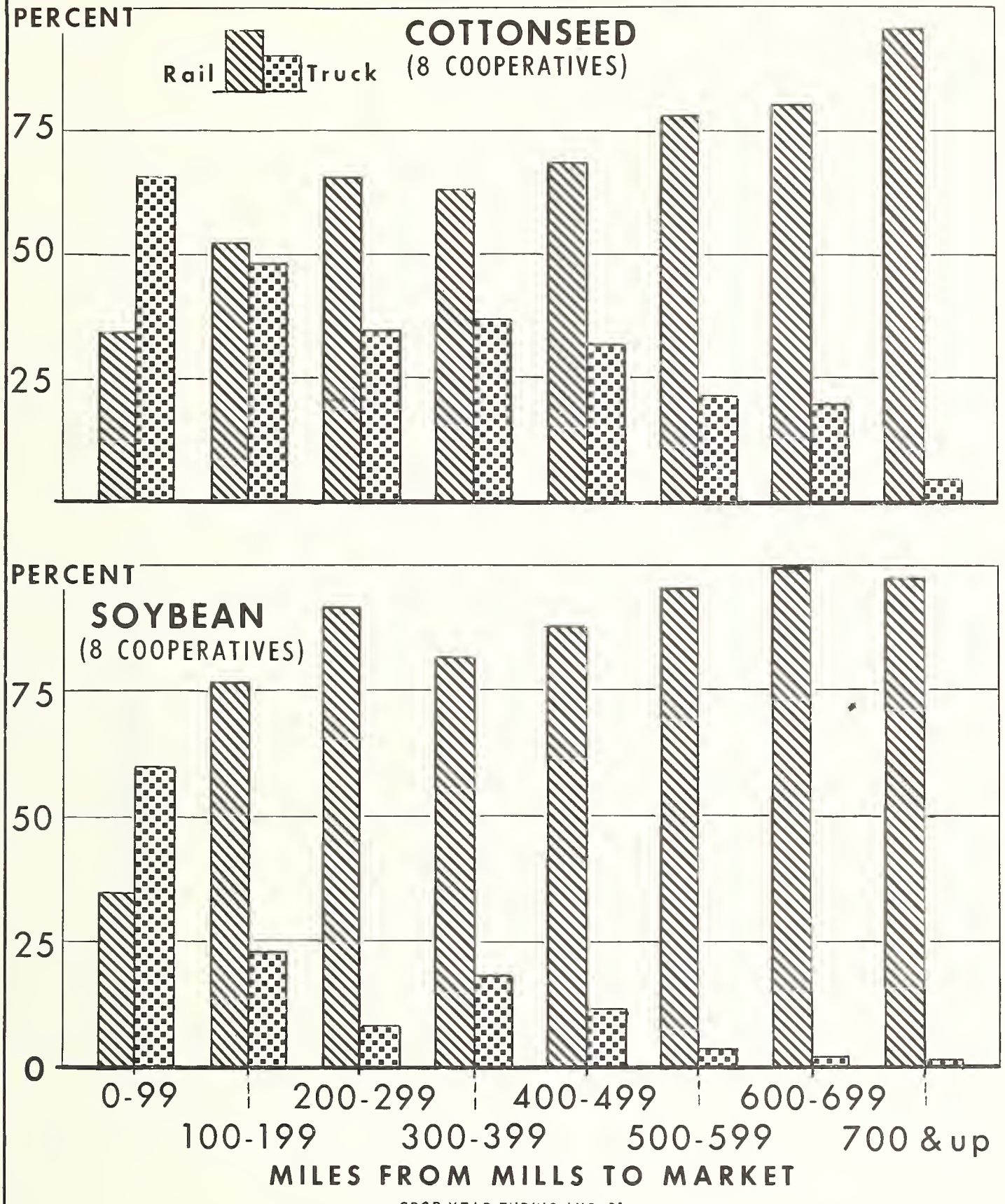
Rail and truck charges for hauling meal are shown in table 21 and in figure 6. The level of railroad charges was lower for cottonseed meal than for soybean meal through 500 miles, and for 700 miles and over. Truck charges for cottonseed meal were obtained for all mileage blocks, but for soybean meal, information was available for distances only through 500 miles. In view of the fact that a variety of different-sized trucks were involved in moving

Table 20.--Rail and truck movement of cottonseed and soybean meal, by mileage block, 16 cooperatives, crop years ending 1961, 1962, and 1963

| Mileage block[1] | Cottonseed | | Soybean | |
|---|---|---|---|---|
| | Rail | Truck | Rail | Truck |
| | Percent | | | |
| 0-99 | 34 | 66 | 35 | 65 |
| 100-199 | 52 | 48 | 77 | 23 |
| 200-299 | 66 | 34 | 92 | 8 |
| 300-399 | 63 | 37 | 82 | 18 |
| 400-499 | 68 | 32 | 88 | 12 |
| 500-599 | 78 | 22 | 96 | 4 |
| 600-699 | 80 | 20 | 100 | -- |
| 700 and over | 95 | 5 | 98 | 2 |
| Total | 68 | 32 | 73 | 27 |

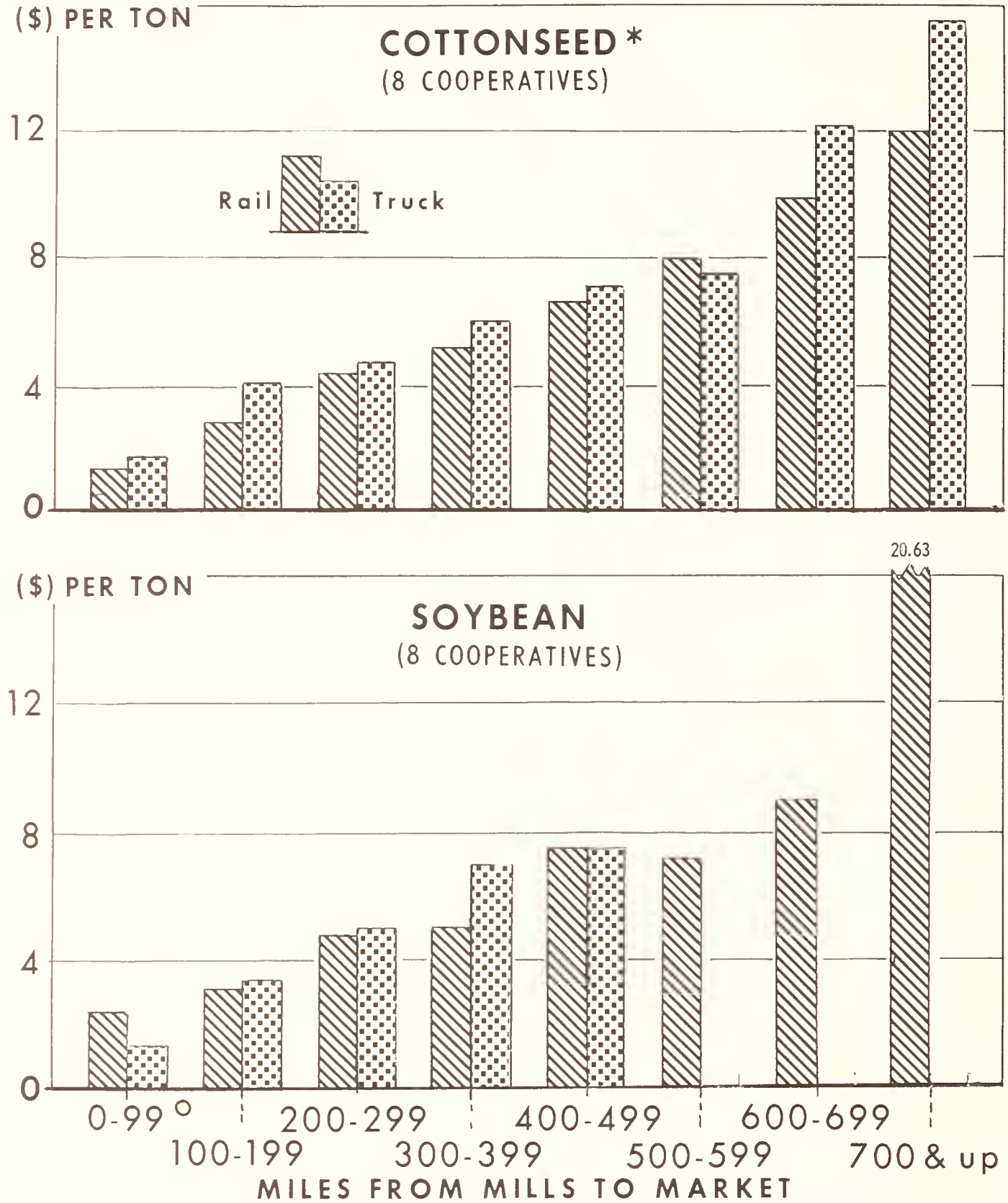
[1] Miles from mills to market

# FIG. 5 -- RAIL AND TRUCK SHIPMENTS OF COTTONSEED AND SOYBEAN MEAL ,1961-63




CROP YEAR ENDING AUG. 31.

# FIG. 6 -- COSTS OF SHIPPING COTTONSEED & SOYBEAN MEAL BY RAIL AND TRUCK, 1961-63




CROP YEAR ENDING AUG. 31. * NO RATE RECORD ON 14,907 TONS OF 720,583 TOTAL COTTONSEED MEAL TONNAGE.

° SWITCHING CHARGE ON LOCAL TRAFFIC INCLUDED.

Table 21.--Costs of shipping cottonseed and soybean meal, by mileage block, 16 cooperatives, crop years ending 1961, 1962, and 1963

| Mileage block [1] | Cottonseed [2] | | Soybean | |
|---|---|---|---|---|
| | Rail | Truck | Rail | Truck |
| | Dollars per ton | | | |
| 0-99 | 1.48 | 1.79 | 2.43 [3] | 1.80 |
| 100-199 | 2.89 | 4.13 | 3.14 | 3.42 |
| 200-299 | 4.41 | 4.77 | 4.80 | 5.02 |
| 300-399 | 5.18 | 6.01 | 5.06 | 6.94 |
| 400-499 | 6.69 | 7.19 | 7.63 | 7.63 |
| 500-599 | 8.04 | 7.54 | 7.22 | -- |
| 600-699 | 9.92 | 12.19 | 9.08 | -- |
| 700 and over | 12.13 | 15.51 | 20.63 | -- |

[1] Miles from mills to market

[2] No rate record on 14,907 tons of 720,583 total cottonseed meal tonnage.

[3] Switching charge on local traffic included.

the meal, as opposed to the so-called standard railroad car, it is somewhat surprising to find the slight differences in some of the mileage blocks. In fact, the average charges for soybean meal movements in the 400-499 mileage block were exactly the same via railroad and truck. The total transportation bill for cottonseed meal was estimated at slightly over $4 million, whereas transportation of soybean meal cost almost $12 million. [7]

## Seasonal Patterns of the Movements

The seasonal patterns of oil and meal shipments were analyzed for each year of the 3 years studied and for the overall period. The oil movement pattern is shown in table 22 and the meal movement pattern in table 23. For the 3-year period, both soybean oil and meal shipments appeared to be more uniform in each quarter-year than shipments of cottonseed products. One of the large cottonseed mills had a policy of accumulating inventory during the heavy crushing months in the fall and marketing the meal during the following summer when other mills were closed. Another mill started crushing in June. No attempt was made to study seasonal patterns of soybeans or cottonseed shipments since the records were analyzed for only 1 year.

## Influence of Private Trucking

Trucks owned and operated by the buyers and sellers of meal were an important factor in the transportation of soybeans and cottonseed into, and meal away from, the mills. Few of these carriers transported oil, which, when hauled by truck, was handled by contract motor carriers. Highway common carriers played an insignificant role in the movement of all commodities.

Mills operating their own motortrucks used them primarily in hauling soybeans and soybean meal. Data on their operating costs are found in table 24. While percentage distributions of various operating cost

[7] Rail rates were studied for cars varying from 20 to 40 tons in capacity. Truck rates were taken for trucks varying from 5- to 24-ton capacity. Many of the trucks were owned and operated by the plants and were used on two-way hauls. Others were owned by meal purchasers, and their movements from the mill could not be traced. Truck rates were estimated by mill managers, or were obtained from the trucking firms. Some trucks were operated on intra-State rate scales where established by State laws.

Table 22.--Seasonal patterns of cottonseed and soybean oil movements, 16 cooperatives, crop years ending 1961, 1962, and 1963

| Time period | 1960-61 | | 1961-62 | | 1962-63 | | 3-year average | |
|---|---|---|---|---|---|---|---|---|
| | Cotton-seed | Soy-beans | Cotton-seed | Soy-beans | Cotton-seed | Soy-beans | Cotton-seed | Soy-beans |
| | Percent | | | | | | | |
| 1st quarter Sept.-Nov. | 27.2 | 18.7 | 25.9 | 24.5 | 24.6 | 26.7 | 25.9 | 23.0 |
| 2nd quarter Dec.-Feb. | 32.2 | 43.3 | 27.5 | 26.5 | 30.5 | 28.7 | 29.9 | 32.3 |
| 3rd quarter March-May | 23.5 | 19.5 | 23.4 | 22.5 | 27.4 | 20.3 | 24.7 | 21.2 |
| 4th quarter June-Aug. | 17.1 | 18.5 | 23.2 | 26.5 | 17.5 | 24.3 | 19.5 | 23.5 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Table 23.--Seasonal patterns of cottonseed and soybean meal movements, 16 cooperatives, crop years ending 1961, 1962, and 1963

| Time period | 1960-61 | | 1961-62 | | 1962-63 | | 3-year average | |
|---|---|---|---|---|---|---|---|---|
| | Cotton-seed | Soy-beans | Cotton-seed | Soy-beans | Cotton-seed | Soy-beans | Cotton-seed | Soy-beans |
| | Percent | | | | | | | |
| 1st quarter Sept.-Nov. | 28.2 | 27.9 | 30.8 | 25.2 | 31.7 | 25.0 | 30.2 | 25.8 |
| 2nd quarter Dec.-Feb. | 28.2 | 27.3 | 29.5 | 25.7 | 31.2 | 26.2 | 29.7 | 27.9 |
| 3rd quarter March-May | 23.5 | 23.5 | 24.4 | 24.8 | 22.4 | 24.6 | 23.3 | 23.8 |
| 4th quarter June-Aug. | 20.1 | 21.3 | 15.3 | 24.3 | 14.7 | 24.2 | 16.8 | 22.5 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

components remained fairly constant for each of the three years studied, total operating costs increased and costs per ton decreased.

Private trucks offer many economic advantages to the mills and, in some instances, would be used even though their costs were higher on comparable movements than common carrier charges. Many meal customers have no rail facilities; bulk shipments can be delivered directly to storage facilities on the farm or ranch; loads can be tailored to meet individual needs; and more adequate control is possible over the scheduling and routing of the shipments. Private trucks are considered a convenience item in the operating and selling program of the mills and, as such, their use is likely to continue, if not expand, in the future as a significant element in the transportation picture.

Table 24.--Average costs of operating private motortrucks hauling soybeans and products, 4 cooperatives, crop years ending 1961, 1962, and 1963

| Item | 1960-61 | 1961-62 | 1962-63 |
|---|---|---|---|
| Trucks operated | 47 | 51 | 60 |
| Average size (tons) | 19 | 20 | 20 |
| Total miles operated | 2,531,188 | 2,713,735 | 2,937,843 |
| Average miles per truck | 51,461 | 53,210 | 48,964 |
| Total tons hauled | 377,811 | 474,096 | 521,382 |
| Avg. tons per truck | 8,038 | 9,296 | 8,689 |
| Operating costs-all trucks: | | Percent | |
| Total wages and salaries | 40.2 | 40.3 | 41.3 |
| Total gas, oil, and lubrication | 24.2 | 19.8 | 19.6 |
| Repairs and tires | 12.0 | 14.8 | 12.8 |
| Depreciation | 12.0 | 12.1 | 13.3 |
| Miscellaneous [1] | 11.6 | 13.0 | 13.0 |
| Total | 100.0 | 100.0 | 100.0 |
| Total expenses | $ 791,671 | $ 865,969 | $ 933,534 |
| Total expense per truck | $16,844 | $16,980 | $15,559 |
| Operating cost per mile | 31.9¢ | 31.3¢ | 31.5¢ |
| Operating cost per ton | $ 2.09 | $1.83 | $1.78 |

[1] Includes insurance, license fees, employee benefits, unemployment taxes, use taxes, drivers' meals, telephone, and supplies.

## Transportation Problems of the Mills

From the interviews with plant managers and traffic personnel, several observations may be made about transportation problems, particularly with respect to the oil and meal movements. One of the problems mentioned most frequently concerned the short supply, or consistently late arrivals, of railroad hopper cars for meal shipments. Also, in some instances boxcars furnished were of poor quality (averaging 8 to 10 percent of the cars ordered) but had to be loaded because of inadequate storage space.

There appeared to be no problem in obtaining tank cars, but some of the mills were concerned about loading facilities because of the trend toward using larger capacity equipment. Operators of the few mills using water carriers had similar complaints about the supply of jumbo roll cover barges. Others suggested the possibility of truck shortages if trucks were used on grain movements as a result of the lack of adequate rail cars.

Another problem was the level of rates and the need for adjustments. Rates throughout the 3-year period had been changed in a variety of ways. Most of the rate adjustments were related to railroad movements, since the large majority of truck shipments were under neither State nor Federal economic regulation. As mentioned previously, private trucks tend to influence the rate levels which for-hire carriers must meet. In order to compete, the railroads had introduced lower rates when larger capacity cars were utilized. This was particularly important in oil movements--an example was the reduction granted on west coast shipments. The rate on these shipments was reduced from $1.43 per 100 pounds for a 30-ton car to $1.00 per 100 pounds for a 75-ton car. Reductions of a similar nature were made on shipments into Chicago. Meal rates were reduced either by a straight rate adjustment or by applying different minimum weights. Pressure continued, however, for railroad rate adjustments, the most highly publicized proposal being one concerning the movement of soybean meal into California. Many cooperatives had complaints on alleged rate discrimination favoring export ports over domestic markets. Rates on jumbo barges appeared to be satisfactory, although relatively few barges were used in the period studied.

Other transportation problems causing concern included loss and damage on bulk movements, lack of transit privileges for cottonseed mills, delay at switching and interchange points, amount of capital tied up in transportation equipment, the upward trend in trucking costs, warehousing of meal on weekends, and the scheduling of shipments by both rail and motor carriers. Conspicuous by its absence was a problem usually high on the list of traffic departments--namely, the problem of the empty backhaul in privately operated trucks. Since the trucks were owned either by the meal buyers or the mills, they were operated on the two-way haul of seed and beans inbound, and meal outbound. Where trucks were used for oil shipments, the mills often were able to arrange for backhauls.

## Impact of the Transit Privilege

As transit privileges are not granted by the railroads to cottonseed processors, the discussion of this topic will be confined to the soybean movements.

Transit permits the interruption of a soybean shipment between origin and destination for purposes of milling. The movement of raw beans and processed meal is considered one shipment at one through rate, rather than two shipments at the higher combination of two local rates. [8]

[8] Under our freight classification rules, a joint, or through, rate usually takes precedence over a combination of local rates.

Approximately 18 percent of the weight of soybeans moving to the processing plants did not move under the transit privilege. This included soybean oil, moisture, and foreign materials. Oil may have an in-transit rate, but only when the processor is also the refiner. Specific rules on transit vary among railroads, and only the general impact on soybean processors can be pointed out.

Transit privileges tend to favor large-scale processing. Large processing mills are enabled to compete with smaller, spatially separated mills for soybean procurement and can also compete successfully in the meal markets of plants located near consuming points. [9]

From 35 to 100 percent of the meal shipped from the soybean mills moved on a transit privilege. Shipments from one of the mills were used as an example of the effect of transit on the costs of transportation. Comparisons of the costs of railroad inbound and outbound traffic to specific destinations with that of inbound truck movements of soybeans and outbound rail movement of meal showed a savings of $7,903 in 1 year by the use of the transit privilege.

For this same cooperative, costs were reduced $29,474 during the year by moving the commodities as one shipment, rather than two separate movements into, and out of, the plant by railroad. Equivalent tonnage using trucks inbound and rail outbound resulted in a saving under two separate rail movements of $21,571 also during the same year. There was no attempt to combine truck and barge shipments since most of the mills were not located on waterways.

If the transit privilege were eliminated, as is proposed from time to time in current rate adjustment discussions, it was estimated that the costs of moving soybeans to the mills by rail would increase 6 to 8 cents per bushel. This could be offset, however, by availability of lower nontransit rail rates. It was further suggested that trucks would probably be used more extensively for these movements and that a possible reduction in the market areas could result.

In addition, some of the mills might face the problem of relocation--others might be forced out of business. Still others would seek alternative forms of transportation with the possibility of combining trucks and barges in the movement pattern. The general consensus was that the railroads would lose a large share of their current traffic unless freight rate levels were reduced correspondingly, and that major policy decisions concerning relocation would face management.

## Effect of the Decatur-Plus Pricing System for Soybeans

At Decatur, Ill., in the early 1920's, soybean processing was started on a commercial scale. The advantage of an early start, plus its location in the heart of an expanding soybean-producing area with market outlets for products in Illinois, made Decatur the center of soybean processing in the Nation. As a result, a business custom of quoting prices f.o.b. Decatur developed. The basing point pricing system became established as additional plants located in surrounding areas and quoted prices on the basis of Decatur price plus freight from Decatur to their consumers. This pricing system meant that customers paid the freight rates from Decatur, regardless of the location of the mills. To sell in some markets, mills had to absorb freight charges, whereas customers in many instances paid "phantom freight rates."

As long as the basing point system was widely used, the most advantageous location for a processing plant was at the farthest point possible from Decatur where local soybeans were available and where meal could be sold locally at the Decatur price plus freight, thus allowing the

[9] Hiroshi Nakamura; Structure of the Soybean Processing Industry of the United States; Ph.D. dissertation, University of Illinois, Urbana, Ill., 1963; Reprinted by University Microfilms, Inc., Ann Arbor, Mich. See also Lehman B. Fletcher and Donald D. Kramer; The Soybean Processing Industry; unpublished manuscript, Iowa State University, Ames, Iowa.

processor to retain the freight advantage as revenue. Accordingly, plants were built in the expanding soybean-producing areas in surrounding States and aggressive competition from the new mills made it difficult for the Decatur processors to sell their products.

A few of the mills in this study followed the Decatur-plus pricing system and retained the freight advantage as revenue. Others used it as a guide for pricing but were not rigidly fixed to the system. Still others priced on an f.o.b. mill basis only. There was a general feeling that the Decatur-plus price was still a factor in stabilizing the market, but it was also recognized that the highly competitive aspect of the milling industry was forcing the mills into an f.o.b. mill price system. The evidence appeared to indicate a trend away from Decatur-plus pricing.

An example of this trend is seen in the average wholesale prices of 44 percent soybean meal shipped to Eastern Shore consumers between 1957 and 1962. In 1962, the freight rate per ton from Decatur was $16.50, whereas the published rate was $15.80 per ton. The following table shows the narrowing of the spread in wholesale prices between Decatur and Baltimore.[10]

| | Decatur | Baltimore | Difference |
|---|---|---|---|
| 1957-58 | $53.40 | $67.65 | $14.25 |
| 1958-59 | 55.80 | 69.90 | 14.10 |
| 1959-60 | 55.55 | 68.40 | 12.85 |
| 1960-61 | 60.60 | 73.35 | 12.75 |
| 1961-62 | 63.60 | 72.40 | 8.80 |

## Transportation Factors Affecting Future Location of Mills

There are three important transportation factors which affect the location of processing mills. One is the existence of a transit system applicable to the processing operations; another is the rate relationship existing on the raw and processed products; and the third is the availability of transportation to serve widespread markets. Since cottonseed oil mills have no transit privilege on meal, the first factor can be dismissed as a force in location, and the emphasis placed upon the other two factors. Soybean oil mills, on the other hand, would be affected by all three factors, assuming that the transit system was continued by the railroads.

The importance of the transit privilege to the soybean processors cannot be minimized. Not only does it equalize locational advantages of the mills, but it also provides additional terminal services at a small cost or at no cost. The reduction in total costs may be reflected in higher prices for the soybeans, or lower prices for the meal, or both. The transit privilege also facilitates larger sized mills by allowing the movement of the commodities over larger areas. This, in turn, may mean a more efficient plant operation on the one hand, and additional markets for soybeans and meal on the other.

Any major change in this factor of transportation could bring about drastic changes in the competitive position of the individual mills. Yet recent railroad pricing practices, including the introduction of incentive and volume rates, often call for a reduction in, or elimination of, transit in their freight rate structures.[11] The use of such rates, which are greatly reduced below previous rate levels, assumes that the shipper is willing to give up certain services in order to obtain the lower rates.

---

[10] Feed Market News, U.S. Dept. Agr., Agr. Mktg. Serv., Vol. 45, No. 40, October 3, 1962.

[11] The theory behind the incentive type of freight rate is to reduce cost by obtaining greater utilization of the capacity of the car. Volume rates are those which cover several carloads shipped at one time by one shipper to one consignee on one bill of lading. Often these rates call for a minimum total tonnage for the series of cars moving under the rates.

Also important as a locational device is the rate relationship between the movement of cottonseed and soybeans into the mills, and the movement of oil and meal from the mills. Insofar as transportation costs are concerned, the general principle governing the location of processing activities is that a mill will locate where the aggregate transportation charges are lowest. Whether the mill locates near the sources of the raw materials or near the consuming markets will generally depend upon the loss of weight in processing and the relationship of the rates between the raw and processed products.

The loss of weight in the milling of cottonseed and soybeans amounts to $1\frac{1}{2}$ to 2 percent of the weight of the raw material. Approximately 48 pounds of a 60-pound bushel of soybeans are converted into meal and an additional 10 to 11 pounds are converted into oil. On a ton of cottonseed, the yields are about 350 pounds of oil and 900 pounds of meal. Hulls and linters account for most of the remainder.

A considerable reduction in the soybean or cottonseed railroad rates to areas distant from mills located in the producing area, without an equivalent reduction in rates on the products, would tend to increase the movement of soybeans and cottonseed to mills located near distant markets. As a result, both oil and meal would be produced more advantageously at the distant points. However, it must be recalled that approximately 90 percent of the cottonseed and about 50 percent of the soybeans were hauled by privately owned trucks; for short distances, a similar situation existed on the carriage of meal. Also, it should be pointed out that the heavy cottonseed- and soybean-producing areas are among the largest users of meal and consume large quantities of crude oil for manufacturing edible fats and oil products. Therefore, the plant at the source of raw materials can minimize its transport costs by buying cottonseed or soybeans, selling the meal for local consumption, and delivering the oil to nearby markets.

The fact that the railroads appear to be interested in maintaining a relatively reasonable relationship between rates on soybeans and cottonseed, and rates on their products, is supported by the success of some mills in getting selective rate reductions on meal and oil movements. However, it is evident that recent proposals would tend to lower the level of rates on cottonseed and soybeans, particularly soybeans, to distant points for milling without corresponding reductions in rates on products. This trend should be studied most carefully by plant managers.

A third transportation factor important to mill location is the availability of transportation services. With relatively lower cost service provided by multiple car rail rates and by trucks and water carriers, it is probable that milling will occur at points other than those traditionally associated with soybean-producing areas.

The variety of transportation services available to the mills is obvious from the data shown in this report. Whereas barge movements did not appear to be significant in the period studied, traffic personnel interviewed indicated that a great deal of attention was being directed to use of barges for future movements of meal and oil.

All of the foregoing discussion has been in terms of domestic movements. However, foreign procurement of the raw materials and finished products may also have an effect on plant location. For example, when relatively small quantities of soybeans were exported (in the late forties and early fifties), producing areas in the midsouth were almost tributary to the Chicago market, since there were no processing plants buying soybeans in these areas. Soybeans, therefore, were sold at a discount which approximated the cost of transportation to Chicago. When soybean exports increased tremendously, soybeans in the midsouth commanded a premium over Chicago prices because of their proximity to the New Orleans export port. Higher prices of soybeans in areas adjacent to export ports certainly discourage processing operations near these ports in the south and east, since processors would have to compete for procurement of beans with foreign buyers who are willing to pay higher prices to obtain soybeans from the United States.

Of the three transportation factors most important in plant location, it is probable that the milling-in-transit privilege is the most significant for soybean processors. For both cottonseed and soybean processors, the rate relationship of inbound and outbound movements will continue to be of great importance. If the trend toward use of privately-owned facilities should continue to rise, this force would lose some of its significance, since control of equipment and service would slowly pass to the mills. The third factor, availability of equipment and service, is a perennial problem in the movement patterns. Its importance in mill location will rise or fall as decisions to use regulated, versus privately owned, equipment are made by plant management; but at present, it would seem to have the lowest rank among the three forces.

# Appendix

Appendix table 1.--Tonnage distribution and shipping cost per ton of cottonseed and soybean receipts, by mileage blocks, 16 cooperatives, crop year 1962-63.

| Mileage block[1] | Cottonseed | Soybeans | Cottonseed | Soybeans |
|---|---|---|---|---|
| | Percent | | Dollars per ton | |
| 0-10 | 7.7 | 10.2 | 1.87 | 0.91 |
| 11-20 | 15.5 | 10.2 | 2.16 | 1.41 |
| 21-30 | 15.6 | 12.7 | 2.41 | 1.56 |
| 31-40 | 14.4 | 11.2 | 2.63 | 1.57 |
| 41-50 | 11.8 | 10.0 | 2.92 | 1.88 |
| 51-60 | 9.2 | 6.6 | 3.12 | 1.91 |
| 61-70 | 7.6 | 6.5 | 3.32 | 2.18 |
| 71-80 | 6.0 | 7.6 | 3.73 | 2.46 |
| 81-90 | 1.3 | 4.2 | 4.12 | 2.59 |
| 91-100 | 2.4 | 3.8 | 4.28 | 2.86 |
| 101-110 | 1.6 | 4.9 | 4.52 | 3.26 |
| 111-120 | 1.0 | 1.6 | 4.76 | 3.59 |
| 121-130 | 1.2 | 1.8 | 4.58 | 3.87 |
| 131-140 | .5 | 1.0 | 4.60 | 3.94 |
| 141-150 | 1.3 | .3 | 4.80 | 3.98 |
| Over 150 | 2.9 | 7.4 | 5.62 | 5.37 |
| Total | 100.0 | 100.0 | 2.91 | 2.20 |

[1] Miles from origins to mills.

Appendix table 2.--Distribution of soybean receipts, by mileage blocks, 8 cooperatives, crop year 1962-63

| Mileage block[1] | Tons | Percent of total | Percent by rail | Percent by truck | Dollar shipping cost per ton |
|---|---|---|---|---|---|
| 0-10 | 140,872 | 10.2 | 8.9 | 91.1 | 0.91 |
| 11-20 | 141,479 | 10.2 | 30.0 | 70.0 | 1.41 |
| 21-30 | 175,417 | 12.7 | 56.5 | 43.5 | 1.56 |
| 31-40 | 155,027 | 11.2 | 28.3 | 81.7 | 1.57 |
| 41-50 | 137,920 | 10.0 | 46.2 | 53.8 | 1.88 |
| 51-60 | 91,128 | 6.6 | 40.6 | 59.4 | 1.91 |
| 61-70 | 90,486 | 6.5 | 47.5 | 52.5 | 2.18 |
| 71-80 | 105,188 | 7.6 | 70.2 | 29.8 | 2.46 |
| 81-90 | 58,421 | 4.2 | 71.6 | 28.4 | 2.59 |
| 91-100 | 52,900 | 3.8 | 63.2 | 36.8 | 2.86 |
| 101-110 | 68,068 | 4.9 | 75.0 | 25.0 | 3.26 |
| 111-120 | 22,295 | 1.6 | 63.6 | 36.4 | 3.59 |
| 121-130 | 24,937 | 1.8 | 78.0 | 22.0 | 3.87 |
| 131-140 | 13,683 | 1.0 | 59.9 | 40.1 | 3.94 |
| 141-150 | 4,173 | .3 | 69.0 | 31.0 | 3.98 |
| Over 150 | 101,617 | 7.4 | 98.9 | 1.1 | 5.37 |
| Total | 1,383,611 | 100.0 | 50.1 | 49.9 | 2.20 |
| | | | | Total cost | $3,052,526 |

[1] Miles from origins to mills.

Appendix table 3.--Volume of soybean and cottonseed oil shipped to major destinations, 16 cooperatives, crop years ending 1961, 1962, and 1963

| Destination | 1960-61 | | 1961-62 | | 1962-63 | | 3-year average | |
|---|---|---|---|---|---|---|---|---|
| | Soybean | Cottonseed | Soybean | Cottonseed | Soybean | Cottonseed | Soybean | Cottonseed |
| | Percent | | | | | | | |
| Houston | -- | 36 | 1 | 17 | 1 | 26 | 1 | 26 |
| Memphis | 7 | 23 | 1 | 41 | 1 | 29 | 2 | 32 |
| Denison-Sherman | 10 | 10 | 6 | 14 | 6 | 13 | 7 | 10 |
| Jacksonville | 2 | 4 | 1 | 5 | 2 | 4 | 2 | 4 |
| New York area | 4 | 4 | 4 | 3 | 3 | 2 | 4 | 3 |
| Gretna, La | 1 | 4 | -- | 2 | 1 | 3 | 1 | 6 |
| Chicago area | 15 | 5 | 9 | 4 | 12 | 2 | 12 | 3 |
| Louisville | 1 | 3 | -- | 4 | -- | 2 | -- | 2 |
| Eastern Canada | -- | 2 | -- | 2 | -- | 2 | -- | 2 |
| St. Louis | 3 | 2 | 2 | -- | 8 | 1 | 4 | 1 |
| West coast | 24 | 1 | 19 | -- | 16 | -- | 19 | -- |
| New Orleans | 11 | -- | 23 | -- | 19 | -- | 18 | -- |
| Opelousa, La | -- | -- | -- | 2 | -- | 1 | -- | 1 |
| Dallas | -- | -- | 3 | 3 | 1 | 3 | 2 | 1 |
| Mankato, Minn | -- | -- | 3 | -- | 2 | -- | 2 | -- |
| Baltimore | -- | -- | 2 | -- | 1 | -- | 2 | -- |
| Charleston, S. C. | -- | -- | 2 | -- | 2 | -- | 2 | -- |
| Abilene, Tex | -- | -- | -- | 3 | -- | 3 | -- | 2 |
| Greenville, Miss | -- | -- | -- | -- | -- | 3 | -- | 1 |
| Decatur, Ill | 1 | -- | 1 | -- | 3 | -- | 2 | -- |
| Minneapolis | -- | -- | -- | -- | 2 | -- | 1 | -- |
| Ivorydale, Ohio | -- | -- | -- | -- | 2 | -- | 1 | -- |
| Other [1] | 21 | 6 | 23 | -- | 18 | 6 | 18 | 6 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Total tons | 179,770 | 97,286 | 243,730 | 100,029 | 270,130 | 100,970 | 693,630 | 298,285 |

[1] Each destination less than 1 percent of total volume.

Appendix table 4.--Type and amount of transportation equipment used in oil movements to major destinations, 16 cooperatives, crop years ending 1961, 1962, and 1963

| Destination | Cottonseed oil | | | | | Soybean oil | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Number of trucks[1] | Rail | | | | Number of trucks | Rail | | | |
| | | 30T | 37½T | 75T | Total rail cars | | 30T | 37½T | 75T | Total rail cars |
| | Number | | | | | | | | | |
| Houston | 2,516 | 536 | 74 | 12 | 622 | -- | 106 | -- | -- | 106 |
| Memphis | 913 | 2,850 | 23 | 4 | 2,877 | 175 | 413 | -- | -- | 413 |
| Denison-Sherman | 647 | 377 | 60 | 55 | 492 | 513 | 1,200 | 36 | 31 | 1,267 |
| Jacksonville | 6 | 237 | 27 | 36 | 300 | 186 | 187 | 26 | 10 | 223 |
| New York area | -- | 62 | 156 | -- | 218 | -- | 872 | 8 | -- | 880 |
| Gretna, La | -- | 542 | -- | 6 | 548 | -- | 171 | -- | -- | 171 |
| Chicago area | 32 | 215 | 66 | 14 | 295 | 497 | 2,196 | 38 | -- | 2,234 |
| Louisville | -- | 203 | 11 | -- | 214 | -- | 87 | -- | -- | 87 |
| Eastern Canada | -- | 193 | 12 | 1 | 206 | -- | 33 | -- | -- | 33 |
| St. Louis | 2 | 83 | -- | -- | 83 | [4] 662 | 379 | -- | 3 | 382 |
| West coast | -- | -- | -- | -- | -- | -- | 3,363 | 154 | 271 | 3,788 |
| New Orleans | -- | -- | -- | -- | -- | [5] 4,670 | 1,249 | -- | 15 | 1,264 |
| Opelousa, La | 1 | 109 | 22 | 1 | 132 | -- | -- | -- | -- | -- |
| Dallas | 6 | 91 | 20 | 3 | 114 | 197 | 254 | 6 | 6 | 266 |
| Mankato, Minn | -- | -- | -- | -- | -- | 6 | 333 | -- | 6 | 339 |
| Baltimore | -- | -- | -- | -- | -- | -- | 292 | -- | -- | 292 |
| Charleston, S.C. | -- | -- | -- | -- | -- | -- | 265 | -- | -- | 265 |
| Abilene, Tex | -- | 54 | 10 | 53 | 117 | -- | -- | -- | -- | -- |
| Greenville, Miss | [2] 153 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Decatur, Ill | -- | -- | -- | -- | -- | -- | 477 | 2 | 26 | 505 |
| Minneapolis | -- | -- | -- | -- | -- | 110 | 189 | -- | -- | 189 |
| Ivorydale, Ohio | -- | -- | -- | -- | -- | -- | 232 | -- | -- | 232 |
| Other[3] | 60 | 470 | 42 | 13 | 525 | 281 | 1,057 | 18 | 15 | 1,090 |
| Total | 4,336 | 6,022 | 523 | 198 | 6,743 | 7,297 | 13,355 | 288 | 383 | 14,026 |

[1] 20-24 tons. [2] For transshipment by barge. [3] Less than 1 percent of tonnage to each destination. [4] 9 barge-truck combinations. [5] 62 barge-truck combinations.

Appendix table 5.--Tonnage of cottonseed and soybean oil shipped, by mileage block, 16 cooperatives, crop years ending 1961, 1962, and 1963

| Mileage block [1] | 1960-61 | | 1961-62 | | 1962-63 | | 3-year average | |
|---|---|---|---|---|---|---|---|---|
| | Cottonseed oil | Soybean oil | Cottonseed oil | Soybean oil | Cottonseed oil | Soybean oil | Cottonseed oil | Soybean oil |
| | Percent | | | | | | | |
| Under 100 | 19.2 | 1.0 | 16.7 | 3.0 | 19.5 | 3.6 | 18.5 | 2.6 |
| 100-199 | 4.3 | 9.3 | 5.8 | 2.4 | 6.8 | 5.5 | 5.7 | 5.5 |
| 200-299 | 2.5 | -- | 5.3 | .3 | 2.7 | -- | 3.4 | .2 |
| 300-399 | 6.5 | 14.4 | 4.8 | 9.2 | 11.5 | 15.4 | 7.8 | 13.0 |
| 400-499 | 4.5 | 24.4 | 10.0 | 28.9 | 9.2 | 33.3 | 8.0 | 29.4 |
| 500-599 | 41.5 | 2.2 | 22.6 | 1.0 | 23.0 | 4.0 | 28.6 | 2.4 |
| 600-699 | 4.2 | 1.4 | 6.0 | .6 | 3.2 | .7 | 4.4 | .8 |
| 700-799 | 1.8 | 3.2 | 1.2 | 3.7 | -- | 2.9 | .9 | 3.3 |
| 800-899 | 4.2 | .5 | 18.4 | 1.9 | 16.7 | .9 | 13.3 | 1.3 |
| 900-999 | 1.0 | 1.6 | .7 | 3.3 | .2 | 1.2 | .6 | 1.9 |
| 1,000-1,099 | .6 | 1.0 | 1.5 | .7 | .7 | 1.2 | .9 | .9 |
| 1,100-1,199 | 2.4 | 3.8 | 2.0 | 14.6 | 1.4 | 4.6 | 1.9 | 7.9 |
| 1,200-1,299 | -- | 4.1 | .2 | 3.6 | .9 | 3.2 | .4 | 3.6 |
| 1,300-1,399 | -- | 1.5 | .1 | 2.3 | .8 | 3.4 | .4 | 2.5 |
| 1,400-1,499 | 1.0 | -- | .2 | -- | -- | -- | .4 | -- |
| 1,500-1,599 | 1.0 | -- | 1.5 | -- | 1.4 | -- | 1.3 | -- |
| 1,600-1,699 | .4 | -- | -- | -- | -- | -- | .1 | -- |
| 1,700-1,799 | .7 | 4.6 | -- | 1.5 | .1 | -- | .3 | 2.3 |
| 1,800-1,899 | .6 | -- | .5 | -- | .5 | 1.6 | .5 | -- |
| 1,900-1,999 | 3.6 | 27.0 | 2.5 | 23.0 | 1.4 | 18.5 | 2.6 | 22.4 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

[1] Miles from mills to market.

Appendix table 6.--Cost per ton of shipments of cottonseed and soybean oil, by mileage block, 16 cooperatives, crop years ending 1961, 1962, and 1963 [1]

| Mileage block [2] | 1960-61 | | 1961-62 | | 1962-63 | | 3-year average | |
|---|---|---|---|---|---|---|---|---|
| | Cottonseed oil | Soybean oil | Cottonseed oil | Soybean oil | Cottonseed oil | Soybean oil | Cottonseed oil | Soybean oil |
| | Dollars per ton | | | | | | | |
| Under 100 | [3] 3.63 | 4.22 | [3] 3.73 | 4.82 | [3] 3.23 | 4.29 | [3] 3.50 | 4.49 |
| 100-199 | 5.46 | 4.93 | 6.40 | 6.46 | 5.88 | 4.60 | 5.95 | 4.58 |
| 200-299 | 9.89 | -- | 9.92 | 9.10 | 9.59 | -- | 9.82 | 9.10 |
| 300-399 | 9.89 | 10.01 | 7.05 | 7.09 | 9.38 | 6.43 | 9.04 | 7.67 |
| 400-499 | 13.31 | [4] 7.51 | 13.31 | [4] 7.46 | 13.30 | [4] 6.75 | 13.30 | [4] 7.13 |
| 500-599 | 11.63 | 11.25 | 11.82 | 8.43 | 11.46 | 10.97 | 11.65 | 10.65 |
| 600-699 | 12.93 | 15.56 | 13.23 | 14.63 | 12.94 | 15.60 | 13.06 | 15.30 |
| 700-799 | 19.63 | 18.02 | 13.20 | 18.05 | -- | 18.43 | 17.05 | 18.15 |
| 800-899 | 14.85 | 21.30 | 14.30 | 21.80 | 14.12 | 19.93 | 14.22 | 21.22 |
| 900-999 | 25.33 | [5] 16.00 | 23.95 | [5] 16.00 | 23.11 | [5] 16.00 | 24.57 | [5] 16.00 |
| 1,000-1,099 | 22.40 | 23.00 | 23.61 | 23.12 | 23.72 | 23.11 | 23.24 | 23.07 |
| 1,100-1,199 | 20.13 | 23.73 | 23.20 | 25.16 | 24.52 | 23.65 | 22.41 | 24.62 |
| 1,200-1,299 | 23.80 | 22.00 | 22.00 | 22.33 | 25.31 | 22.00 | 25.14 | 22.12 |
| 1,300-1,399 | -- | 24.06 | 25.80 | 26.05 | 27.71 | 24.10 | 27.43 | 24.74 |
| 1,400-1,499 | 25.80 | -- | 26.19 | -- | -- | -- | 25.87 | -- |
| 1,500-1,599 | 29.93 | -- | 23.89 | -- | 29.12 | -- | 31.44 | -- |
| 1,600-1,699 | 28.60 | -- | 30.50 | -- | -- | -- | 28.60 | -- |
| 1,700-1,799 | 30.00 | 25.15 | 30.64 | 18.60 | 30.00 | 18.60 | 31.92 | 22.00 |
| 1,800-1,899 | 30.77 | -- | 35.67 | -- | 30.37 | -- | 30.60 | -- |
| 1,900-1,999 | 30.82 | 28.37 | 36.56 | 28.51 | 36.20 | 24.07 | 33.11 | 27.04 |

[1] Computed by multiplying each movement (tonnage) by actual rate, then dividing actual cost by the tonnage in each mileage block.
[2] Miles from mills to market.
[3] Including local tonnage switched at $2.30 per car.
[4] Combination truck-barge rate on over 90 percent of the tonnage.
[5] Truck-barge rate.

Appendix table 7.--Percentage distribution of shipments of cottonseed and soybean meal, by mileage blocks, 16 cooperatives, crop years ending 1961, 1962, and 1963

| Mileage block[1] | Total volume | | Rail | | Truck | |
|---|---|---|---|---|---|---|
| | Cottonseed | Soybean | Cottonseed | Soybean | Cottonseed | Soybean |
| | Percent | | | | | |
| 0-49 | 4.8 | 10.7 | 4.6 | 2.5 | 5.1 | 28.4 |
| 50-99 | 3.2 | 31.7 | 4.9 | 24.9 | 1.7 | 46.2 |
| 100-149 | 5.2 | 17.7 | 4.5 | 19.4 | 5.8 | 14.3 |
| 150-199 | 2.7 | 6.8 | 3.6 | 8.2 | 1.8 | 4.1 |
| 200-249 | 4.4 | 6.9 | 3.9 | 9.3 | 4.8 | 1.8 |
| 250-299 | 30.3 | 4.4 | 16.6 | 6.0 | 42.8 | .8 |
| 300-349 | 5.4 | 1.8 | 8.5 | 1.8 | 2.7 | 1.5 |
| 350-399 | 13.5 | 1.9 | 13.1 | 2.5 | 13.7 | .4 |
| 400-449 | 4.3 | 1.1 | 5.6 | 1.5 | 3.0 | .2 |
| 450-499 | 6.6 | 2.5 | 7.5 | 3.1 | 5.7 | 1.3 |
| 500-549 | 1.2 | 1.7 | 2.1 | 2.3 | .3 | .3 |
| 550-599 | 5.8 | 3.4 | 3.7 | 5.0 | 7.7 | -- |
| 600-649 | 1.7 | .4 | 3.2 | .5 | .3 | -- |
| 650-699 | 4.0 | -- | 6.1 | .1 | 2.4 | -- |
| Over 700 | 6.9 | 9.0 | 12.1 | 12.9 | 2.2 | .7 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Percent distribution between rail and trucks | | | 67.9 | 73.4 | 32.1 | 26.6 |

[1] Miles from mills to market.

Appendix table 8.--Costs of shipping cottonseed and soybean meal, by mileage blocks, 16 cooperatives, crop years ending 1961, 1962, and 1963[1]

| Mileage block[2] | Rail | | Truck | |
|---|---|---|---|---|
| | Cottonseed | Soybeans | Cottonseed | Soybeans |
| | Dollars per ton | | | |
| 0-49 | 1.45 | [3] 1.05 | 1.43 | 1.17 |
| 50-99 | 2.06 | 2.57 | 2.18 | 2.19 |
| 100-149 | 2.68 | 2.98 | 2.97 | 3.15 |
| 150-199 | 3.16 | 3.55 | 3.75 | 4.36 |
| 200-249 | 3.60 | 4.57 | 4.26 | 4.68 |
| 250-299 | 4.61 | 4.77 | 3.72 | 4.84 |
| 300-349 | 4.90 | 4.72 | 4.24 | -- |
| 350-399 | 5.37 | 5.33 | 4.97 | 6.24 |
| 400-449 | 6.42 | 6.30 | 5.90 | 6.94 |
| 450-499 | 6.90 | 6.27 | 5.82 | -- |
| 500-549 | 7.98 | 6.77 | 7.02 | -- |
| 550-599 | 8.08 | 7.43 | 7.53 | -- |
| 600-649 | 9.64 | 8.17 | 9.89 | -- |
| 650-699 | 10.08 | 12.85 | 10.24 | -- |
| Over 700 | 10.77 | 20.63 | 11.02 | -- |

[1] No rate record on 14,907 tons of 720,583 total cottonseed meal tonnage.
[2] Miles from mills to market.
[3] Switching charge on local traffic.



☆ U. S. GOVERNMENT PRINTING OFFICE : 1967

# Other Publications Available

Costs and Practices of Selected Cooperatives in Operating Bulk-Feed Trucks, General Report 132. Thomas H. Camp

Motortruck Operating Costs of Farmer Cooperatives, General Report 121. Thomas H. Camp

Motortruck Operations of Farmer Cooperatives, General Report 109. William C. Bowser, Jr.

Piggyback Transportation for Pacific Northwest Cooperatives, General Report 86. William C. Bowser, Jr.

Losses in Transporting and Handling Grain by Selected Grain Marketing Research Report 766. Joseph E. Rickenbacker and William H. Thompson

Losses of Livestock in Transit in Midwestern and Western States, Marketing Research Report 247. Joseph E. Rickenbacker

Grain Cooperatives, Bulletin Reprint 1. Daniel H. McVey

Safety-Checking Handling Practices to Reduce Livestock Losses, Information 45. Joseph E. Rickenbacker

Safety-Checking Livestock Trucking to Reduce Loss and Damage, Information 33. Joseph E. Rickenbacker

Safety-Checking Handling Facilities to Reduce Livestock Losses, Information 28. Joseph E. Rickenbacker

Owning or Leasing of Covered Hopper Cars by Farmer Cooperatives, General Report 144. Thomas H. Camp and David Volkin

A copy of each of these publications may be obtained upon request while a supply is available from--

Farmer Cooperative Service
U.S. Department of Agriculture
Washington, D.C. 20250